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Mercerized Cotton—Acetate Rayon Patterned Fabrics

An Account of Practical Mercerizing, Dyeing and Finishing Methods

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A VERY useful fabric for dress purposes is now popular and it consists mainly of cotton with cellulose acetate rayon stripe and check pattern effects. The cotton is mercerized and is usually dyed in comparatively pale shades, while the acetate rayon effects are brightly and often deeply colored so as to stand out in good contrast to the cotton background. Owing to the fact that cotton can be satisfactorily mercerized in the presence of acetate rayon without deleteriously affecting this alkali-susceptible fiber, it is found much the better practice to mercerize this fabric in the piece rather than to weave it with cotton already mercerized in the yarn state.

In order to secure the best results with this cotton-acetate rayon fabric it is necessary to take certain precautions in the mercerizing, dyeing, and finishing processes, and it is the purpose of this article to deal with some of these practical details of procedure.

In the first place it should be noted that mercerized cotton is essential to the good appearance of the fabric. When mercerization is omitted the fabric looks very cheap, this being due to the striking contrast between the low luster of the cotton and high luster of the rayon. Mercerized cotton not only has a luster approximating to that of the rayon but it has a much cleaner appearance due to removal of motes, and other natural impurities which are commonly found in non-mercerized cotton yarns.

The fabric is of the poplin type so that it appears to have innumerable weft ridges and these emphasize the luster of the mercerized cotton.

The grey fabric should be rapidly examined before processing. Oil stains should be particularly looked for since these are able to cause much trouble in dyeing on account of their affinity for cellulose acetate dyes; this will be referred to later. It is essential that such oil stains be completely removed, so if they are numerous or appear likely to be difficult to remove, special oil-emulsifying agents should be added to the scouring liquors employed. Many such agents are available.

Singeing forms the first process since it is necessary to remove all nap from the fabric in order that it may have a perfectly sheer surface capable of showing all the added luster that mercerization of the cotton can give it. The presence of the rayon makes little difference to the singeing since not only is acetate rayon quite resistant to singeing, as ordinarily carried out with gas flames or the hot copper plate, but the rayon threads are compactly buried in the fabric so that the cotton is more exposed to the heat than the rayon. Both sides of the fabric should be singed.

It may be stated that singeing is an important part of the processing since it much assists successful dyeing. The better the singeing the less does the cellulose acetate dye stain the cotton; this will be discussed later.

As the fabric emerges from the singeing apparatus it should be led through a padding mangle having a dilute solution of a starch liquefying product. Passage of the fabric through this liquor serves both to quench any sparks which may have alighted on the fabric and to impregnate it with the desizing agent. The fabric should now be plaited down in piles and allowed to lie for at least four hours. During this period the starch size usually present in the cotton yarns is solubilized while other impurities are loosened. At this stage the fabric is run through an open soaping plant or merely through a washing "box" for the purpose of removing all soluble and loose impurities. It is not necessary to use soap for this purpose; boiling water is quite satisfactory since in most cases the fabric will be scoured and bleached fully at a later stage.

After washing, the fabric must be completely dried before mercerization.

The mercerization process was first found practicable by W. Marshall and he patented his method (E. P. 210,484). The conditions found essential to satisfactory mercerization were that the alkaline mercerizing liquor should be reasonably cold, that the washing out of the alkali should be carried out quickly, and that the washing should be effected with cold water. It was found by Marshall, and quite contrary to anticipations, that under these conditions the cellulose acetate rayon was not saponified sufficiently to have an appreciable affinity for direct cotton dyes.

As is well known, cellulose acetate rayon saponifies so that it no longer resists direct dyes when it is immersed in a dilute solution of caustic soda. It is only when the caustic soda liquor is quite concentrated as in the case of a mercerizing liquor (the usual liquor is not less than 50° Tw.) that saponification does not occur. Thus there is little danger of the acetate rayon being affected while in contact with the mercerizing liquor; it is during the washing off process that there is risk of saponification for at this stage the rayon is for a few seconds in contact with quite dilute alkali. It is for this reason that washing off should be rapidly effected with cold water and the fabric immediately afterwards soured with dilute hydrochloric or sulfuric acid (the latter is preferred since it is cheaper).

It has been mentioned that the fabric should be perfectly dried before mercerization. Obviously it would be cheaper to simply mangle the wet desized fabric and mercerize it without drying, as is often done with plain cotton fabrics, but this is not practicable with cotton-acetate rayon fabric. Saponification would certainly occur owing to dilution within the fabric of the mercerizing liquor. This effect is noticed when the fabric is moistened by a falling water drop (as from an overhead beam on which steam has condensed); the rayon acquires a marked affinity for cotton dyes at the point where the water drop has fallen immediately before mercerization.

Of course it is advisable to maintain the mercerizing liquor cold but it is a surprising fact that saponification does not occur when this liquor is used up to 37° C. Presumably it would be risky to use a hotter liquor, but it has definitely been noticed in practice that no ill effect does take place at 37° C.

It is found that quite satisfactory mercerization is obtained in every way if the total time occupied from the entry of the fabric into the mercerizing liquor until it emerges from the scouring and final washing-off "boxes" is one minute. Of this period, about one-third minute is taken for impregnation of the alkali, one-third minute for washing off the alkali with cold water (the usual spurt pipes and suction boxes provided with a fabric mercerizing machine are advantageous for the rapid removal of alkali), and the remainder of the period is required for the scouring and final washing.

The fabric is now ready for a final purification in preparation for dyeing. In nearly all cases the cotton is required to be dyed in clear bright shades so that it must be bleached white before dyeing.

Bleaching is conveniently carried out in the same jigger machine as that in which the fabric will be afterwards dyed. About five or six pieces can be treated at once. Previous to bleaching the fabric should be thoroughly scoured with a hot soap liquor containing any satisfactory oil-emulsifying agent. As indicated previously, many oils such as are used in lubrication of weaving machinery can act as a solvent for acetate dyes. Consequently if oil stains are present in the fabric during dyeing then these become colored with the acetate dye and so spoil the appearance of the finished fabric. In this connection it is of interest to note an actual instance in which the weaver endeavored to remove loom stains by sponging the stains with petrol, and in so doing occasioned much trouble to the dyer. It appeared that this help of the weaver proved to be a hindrance, for the petrol used was of a poor quality and contained heavy hydrocarbons such that in the sponged parts there was left a residual oil which did not evaporate away with the remainder of the petrol. After dyeing, these stains, which were mainly on the cream colored cotton ground (that part of the stain on the rayon was of course less important) and about two inches in diameter, showed a deep blue color since it was a blue dye which was being applied to the acetate rayon.

Sometimes oil stains are particularly difficult to remove, especially when they have been allowed to age by prolonged storage of the fabric. Scouring is then ineffective and, of course, the fabric cannot be subjected to the more drastic purification process of kiering. It then remains to sponge out the stains by hand with the aid of pure benzene or a petrol free from heavy non-volatile residues. Alternatively, the oil stains in the grey fabric may be sponged with olive oil containing an emulsifying agent so that at a later stage (in the scouring process) the emulsion of mineral and olive oils is easily removed. But in this case the matter should certainly be discussed with the weaver for such treatment by hand is expensive and generally unsatisfactory to all concerned.

In the jigger, the fabric is subject to a considerable amount of warp and even weft tension so that the scouring liquor can be raised to 80° to 85° C. without risk of delustering the acetate rayon, for it must be remembered that this type of fabric is one in which a high luster on the rayon is essential. Acetate rayon under tension is less subject to delustering than is rayon immersed in a hot liquor quite slackly.

After washing out the scouring liquor, the fabric is then ready for bleaching and for this purpose a solution of sodium hypochlorite is most satisfactory. It is usual when bleaching cotton fabric to sour the fabric after bleaching is complete and then remove the acid by thorough washing, but in the case of this cotton-acetate rayon fabric scouring is seldom necessary. Neither is an anti-chlor

treatment required. As soon as the fabric has acquired a suitable white color it should simply be washed with water and then given one or two "ends" in the soap liquor in which it will be afterwards dyed. The soap acts as an anti-chlor and in this manner much time can be saved which would otherwise be lost in washing, souring, and washing.

Dyeing should be carried out in a liquor containing about ¼% of soap or Turkey red oil together with any of the proprietary agents now available for preventing lime soap scum formation. Dyeing of both cotton and acetate rayon may proceed simultaneously by having present in the dyebath the necessary direct and acetate dyes. The acetate dyes should be selected such that they stain the cotton least, and the cotton dyes should be of the acetate rayon resist type. During dyeing it is advisable to add as little salt or Glauber's salt as possible since this only serves to accentuate staining of the cotton by the acetate dye. Also, since the shades required on the cotton are usually of but moderate depth there is really little need for the addition of a salting out substance.

When the cotton is required white or cream or a pale clear shade there is often trouble arising from the staining by the acetate dye. The usual acetate dye consists of particles of a water-insoluble pigment (soluble, of course, in cellulose acetate itself) dispersed with the assistance of Turkey red oil or other suitable subtance. These particles tend to become entangled in the cotton yarn (which consists of numerous tiny fibers tightly twisted together) and it is not easy to remove, by simple washing, these occluded particles. Staining of the cotton is thus mainly occlusion or entanglement of dye particles and is not adsorption as in the case of a direct cotton dye. Hence the more polished is the surface of the cotton yarns and fibers the less likely is staining to occur. It is for this reason that thorough singeing of the cotton-acetate fabric was mentioned earlier as being very desirable. For the same reason, singeing of the fabric should be carried out on both sides. If the fabric is singed on one side only it is found that staining of the cotton is most evident on the side not singed. Good singeing can save a great deal of trouble in the dyeing process for it is essential to avoid staining of the cotton.

After dyeing to the required shade the staining on the cotton can be largely removed by a simple soaping. This generally has only a slight effect on the shade of the acetate rayon and allowance in the dyeing can be made for a slight reduction of color. But in some instances soaping is not sufficient, this being especially the case with blue acetate dyes. In these circumstances the fabric should be cleared with a warm soap liquor containing a small amount of sodium carbonate and sodium hydrosulfite; the acetate dye which persistently adheres to the cotton is thus destroyed or rendered colorless by reduction. In the last resort, a light bleach with sodium hypochlorite can be used and provided that the liquor is maintained slightly alkaline the color on the acetate rayon stripes will be scarcely affected.

As regards staining of the cotton, two other useful points are worthy of mention. It is found from practical experience that if the dyed fabric be dried over the "cans" and then soaped, the removal of the stain on the cotton is much more effective than if the removal is attempted without this preliminary drying. Apparently the drying has the effect of coagulating the particles of dye adhering to the cotton so that they become larger and therefore more easily removed when treated with a detergent soap liquor. Obviously this process of preliminary drying is not universally recommended since it involves considerable extra cost and reduces the output of dyed fabric, but nevertheless it is recommended as a means of dealing effectively with staining difficult to remove by the usual soaping methods as indicated above.

A second consideration in connection with the staining of the cotton is that a preventative measure consists of drying the mercerized fabric before dyeing. It has already been indicated that the fabric after mercerization, washing, souring, and washing, should be at once taken to the jigger for bleaching and dyeing. This is quite satisfactory in a general way but if the fabric is dried before bleaching two advantages are obtained. Firstly the cotton fibers are made less susceptible to staining by the acetate dyes used in the subsequent dyeing process, and secondly the luster of the cotton appears to be higher or at least more pleasing in contrast to that of the rayon. There is a reason for these advantages.

When cotton is mercerized, the twisted ribbon-like form of cellulose of which each fiber consists changes to a swollen cylinder. On drying, this swollen cellulose loses its moisture and becomes more compact. The higher is the temperature of drying the greater is the compactness of the dried cotton, and this can be readily demonstrated by its lower dyeing affinity and reduced moisture absorptive capacity. It would appear that this greater compactness renders the cotton less liable to occlude acetate dye particles, possibly because the surface of each fiber is smoother than it would be without the intermediate drying.

It has been stated that dyeing of the cotton-acetate rayon fabric can be carried out so that both fibers are colored simultaneously. This is of course true for most colors, but there are exceptions and these will now be considered.

It is sometimes required that the rayon shall be colored black and this is somewhat difficult since there is considerable risk of the cotton becoming stained. There is as yet no direct black dye available for coloring cellulose acetate rayon cheaply, so that the method must be adopted of first dyeing the rayon with a color such as Dispersol Diazo Black AS paste or S.R.A. Black IV (the rayon thereby acquires a deep brown color) and then diazotizing and coupling with a naphthol such as beta-oxynaphthoic

acid (the brown color is thus changed to a deep fast black shade). The cotton always becomes slightly stained in this prolonged dyeing process and it is found desirable to give the dyed fabric a good soaping with an alkaline liquor also containing a small proportion of sodium hydrosulfite. But in this particular case, staining can be further reduced by lightly soaping the fabric immediately after dyeing to the first brown shade with the diazotizable dye and before carrying out the diazotizing and coupling processes. In this manner the brown color on the cotton is removed before it is converted into the black dye. Of course a final soaping can be given after the black shade on the rayon is developed.

Another dyeing case of interest is that in which it is required for the cotton to be dyed a fast black and the acetate rayon left white; this also requires special consideration. It may be thought that it would be easier if a fast black were not specified since in such a case one could of course use Chlorazol Black BH or Diphenyl Blue Black BH which readily colors the cotton black without staining the rayon, but this is not so, for a difficulty is experienced in the drying process. A black dye of this type is not fast to washing and it is found that after the fabric has been dyed so that the rayon is quite a good white and it is then mangled and dried on the "cans" there is a marked bleeding of black dye into the rayon whereby this becomes stained and loses its attractive white color. So that the employment of such a loose direct dye is not so favorable to the production of a good black and white fabric as might at first be thought.

Two methods of dyeing the cotton black and leaving the rayon white are available. The first is that of dyeing the cotton with a diazotizable black dye which does not stain the rayon (a number of such dyes are available) and then converting this into a fast-to-washing black by diazotization and coupling. The second method is that of dyeing the cotton with a sulfur black under such conditions that the rayon is left white.

The sulfur dyeing process is of most interest. Usually a sulfur black dye is applied to cotton in a hot bath strongly alkaline on account of the presence of sodium sulfide and a small amount of sodium carbonate. If this method were used for the cotton-acetate rayon fabric here under consideration it is certain that rapid saponification of the acetate rayon would occur and this would be followed by its absorption of the black sulfur dye after the manner of viscose rayon. Various modifications of this dyeing process must therefore be adopted so that the rayon is unaffected.

In one process the dyebath is prepared with the sulfur dye dissolved with the aid of sodium sulfite and sodium sulfide, there being then added about twice the weight of ammonium sulfate as sodium sulfide. Under these circumstances the sodium sulfide is converted into sodium sulfate and ammonium sulfide as the following equation shows

$$Na_2S + (NH_4)_2\,SO_4 = Na_2SO_4 + (NH_4)_2\,S$$

and the ammonium sulfide has no adverse effect on the rayon. Such a dyebath is used at about 40° to 50° C. and is found that it gives quite good results.

In another process the use of sodium sulfide is abandoned as too dangerous, and in its stead is used sodium hydrosulfite together with a small proportion of ammonia (the latter addition prevents the bath from becoming acidic due to the decomposition of the sodium hydrosulfite). It is found that this bath gives quite good results, and no saponification of the acetate rayon takes place. On the other hand, the process is somewhat expensive as regards consumption of dye for it appears to require more dye by this method than when sodium sulfide is employed. Also it is interesting to note that the color of the dyebath is quite different from that of a normal sodium sulfide dye liquor. It is a yellow color instead of a greenish black shade, and this difference is possibly due to the fact that the sulfur black dye exists in a different stage of reduction.

The third alternative method is that in which a sodium sulfide solution of the dye is employed but before use there is added to it a suitable proportion of glucose which neutralizes the saponifying power of the sodium sulfide without detracting from its reducing and solubilizing action on the sulfur dye.

However dyed, the fabric should be thoroughly washed and then softened by impregnation with a solution of any softening agent of proved utility. This operation may be preferably effected by means of a two-bowl padding mangle; it has been found that a simple solution of Monopole soap is quite efficient for softening purposes. After this, the fabric should be dried on the "cans" and then stentered to width. On the stenter the stretching to width is assisted by steaming the fabric at the entry end of the stenter frame. Alternatively the wet softened fabric may be stentered without previous drying if a hot air stenter is available.

Fabric immediately after stentering may be slightly harsh in handle, so that it should be finally softened by giving it a light calender treatment. It is then ready for packing and despatch.

• AMERICAN CYANAMID ANNOUNCEMENT

As a further step in a recent merger of the Structural Gypsum Corporation, American Powder Company, The Selden Company, and other former independent subsidiaries into the American Cyanamid & Chemical Corporation, Arthur J. Campbell has been appointed assistant general sales manager of the corporation. This step will serve to consolidate the activities of the newly created divisions of the corporation. Mr. Campbell at the same time will continue his duties as general manager of the Structural Gypsum Division.

Washington News Letter

By **WALDON FAWCETT**

THE cause of Congressional appropriations for scientific research work is looking up. The period of the 73rd Congress was disastrous to the entire program of technical research sponsored by the Government, whether the expense be borne by the Federal Treasury or shared by professional or trade organizations, as in the case of dyestuffs research. Readers of the REPORTER will recall the havoc that attended the campaign of Departmental administrative economy with which the Roosevelt administration was ushered in.

That curtailment of two years ago was most drastic in the case of the investigational activities of the Department of Commerce. Textile chemists will not forget the shock of the announcement of the disruption of the technical studies at the National Bureau of Standards. Research in marketing, as conducted by the Bureau of Foreign and Domestic Commerce was likewise reduced to a skeleton of its former status. And commodity divisions, such as the section devoted to chemicals, all but passed into eclipse. Of necessity, the road back will be a long one, but a start is to be made by the 74th Congress which assembles in January.

Indeed, December, 1934, rather than January, 1935, may be entered as the date of the turn for the better. Because the final month of the year finds the subcommittees of the Appropriations Committee of the House of Representatives already at work upon the allotment of funds for the operation of the Departments during the fiscal year beginning July 1, 1935. The word has been passed in Cabinet circles that the march of research is to be resumed and the Chairman of the House Committee on Appropriations has promised the requisite funds. Not all branches of technical research will resume in the same stride. For example, it is an open secret at Washington that the Department of Agriculture will be a conspicuous benefactor in the resumption of technical research on a grand scale. Even so, the Agricultural research projects contact the dyestuffs and textile chemistry interests at a number of points. Moreover, there is the heartening assurance that renewed vindication of the principle that technical research as an obligation of the Government imputes a gradual expansion of the entire structure of Federal research.

HOLDING COMPANIES ARE DENIED SUBSIDIARY BRANDS

A blow to centralized control of industrial trade marks has just been struck at the U. S. Patent Office. In deciding, on appeal, a test case pressed by the United States Steel Corporation, the Commissioner of Patents has ruled that, in a most literal sense, a trade mark belongs to the actual user. The Steel Corporation joined this unique issue when it sought to register at Washington a trade mark used by its "owned and controlled companies."

A certificate was denied to the holding company on the ground that property rights in trade marks are created exclusively through the use of the names or symbols in commerce by the proprietor. The consolidating corporation was objected to as being neither a manufacturing nor a selling corporation but solely a stockholding corporation, and, as such not engaged in interstate commerce. The head of the Patent Office took the position that ownership of a part or all of the capital stock of a corporation does not vest in the stockholders, be they few or many, any property rights whatsoever in the trade marks used by a corporation. Each operating corporation is a separate legal entity, regardless of who owns its stock. And the mark it employs, through use in commerce, becomes its property and not that of its stockholders.

This fresh ultimatum to the effect that a trade mark follows trade, in a narrow and literal sense, confirms the wisdom of the promoters of business mergers who have preserved the brand individuality of respective consolidated lines. And have subordinated tying-marks where such group-marks have been superimposed.

OFFICIAL DEMANDS RE COLOR IN LABELING OF SPIRITS

Incident to the recent extension of its Regulatory activities, the Federal Government is revealed as an advocate of the use of color for purposes of emphasis in the labeling of products subject to censorship. This is conspicuously the case in the Regulations Relating to the Labeling of Distilled Spirits which have lately been issued by the Federal Alcohol Control Administration. It is stipulated that all statements be on a "contrasting background." Incidentally, it may be noted that, under the rules as revised, the presence in any distilled spirits of

any coloring material need not be indicated unless such material causes the product to simulate another class or type of distilled spirits. Should the aggregate amount of coloring be in excess of 2½ by volume of the spirits, the name and amount in per cent of volume of each such coloring material must be stated, unless the Administration has granted exemption.

THE TRADE PRACTICE CONFERENCE MAY COME BACK

Speculation is rife just now as to the possibility of the resurrection of the institution known as the Trade Practice Conference,—or, as it was known in earlier days, the Trade Practice Submittal. In the days before the New Deal, the Trade Practice Conference was the device whereby, under impartial auspices of the Federal Trade Commission, the participants in a given industry undertook to arrive at a mutual agreement for the regulation, control or abolishment of trade practices and policies of doubtful propriety. Given an acceptance by a majority of an industry aggregating at least 85 per cent of production, and the Trade Practice treaty took effect with the imputation that the Federal Trade Commission would exercise its police power to discipline any non-signers or errant subscribers who might ignore or violate the terms of the gentleman's agreement.

The Trade Practice Conference ritual supplied the pattern for the NRA Code system. Hence the question of resurrection. If there is a contraction of the activities of the National Recovery Administration, and, more especially, if the enforcement of Code mandates should be, in any considerable measure transferred to the Federal Trade Commission, will it not be logical to rejuvenate the Trade Practice Conference as the best available instrumentality for the self-government of business? Especially if there be available at need the powers of the U. S. Department of Justice for compulsion for compliance with the ethics prescribed by the Code. Full answer must wait, of course, upon conclusive Executive recommendations and the determination, by the new Congress, of the form to be taken by the permanent NRA structure, or whatever institution shall replace it.

THE FUTURE CONTROL OF FOOD COLORS

Much less revolutionary than has been rumored are the changes to be worked in the system of Federal certification of food colors should the revision of the basic law be carried out as planned. When the U. S. Senate Committee considered, in the last Congress, the successive editions of the Tugwell-Copeland Bills, so called, gossip, had it that the contemplated extension of the Food and Drug Act would shake the traditions of food color control. This impression sprang from the proposed prohibition upon the use of uncertified food colors. This 100 per cent control was in sharp contrast to the status under the present law wherein no action can be taken unless it can be proved that colors or their impurities are poisonous and that they are present in such quantities as may be harmful to health.

This proposal is drastic in its way but it will be observed that the contemplated restriction is wholly on the side of the use of dubious coloring materials. No new obligation or responsibility is placed upon the producers and distributors of properly credentialed colors. This distinction is made clear in a statement just made for the REPORTER by Mr. H. T. Herrick, the Principal Chemist in Charge of the Color Certification Section of the Food and Drug Administration, U. S. Department of Agriculture. Said he: "The terms of the proposed statute (the Tugwell-Copeland draft which is due for reintroduction in the coming Congress) impose no greater restrictions on manufacturers, packagers and users of these colors than the present certification regulations. On the other hand, these commercial interests would be relieved of a degree of unfair competition in the sale of uncertified colors which can not be effectively controlled under the terms of the present law."

That the certification system, as now functioning, is not imposing any undue hardships upon the dye industries would seem to be indicated by the record of the past fiscal year, the statistics of which will soon be published. As against the certification, during the twelve months, of a total of 1,338 batches, the rejections or refusals of certification numbered only thirteen batches of straight dyes and six batches each of repacked straight dyes and mixtures.

SAMPLES AND SWATCHES IN THE MAILS

The Post Office Department has not made any reclassification of texture samples and swatches, gossip to the contrary notwithstanding. Such change as has occurred is, indirectly, the result of the Act of June 5, 1934, subsequently applied under Departmental Order No. 5839. This modification applies solely to textile samples when inserted in certain periodicals, weighing over eight ounces, not entered as second class matter. In a statement for this correspondence, the Third Assistant Postmaster General says: "There has been no change in the ruling regarding the use of swatch advertisements, samples of material, etc., in second class publications.

"The law requires that a publication to be entitled to transmission in the mails at the second class rates of postage, must be formed of printed sheets only. A sheet to which cloth or other material is pasted or otherwise attached does not, of course, meet this requirement and such inserts are not permissible in copies of publications mailed at the second class rates.

"Copies of a publication entered as second class matter which are distributed outside the mails should also conform to the regulations. While the Department is desirous of according mailers every facility and privilege to which they are entitled under the law, the practice of inclosing in publications, even though the same be circulated outside the mails, matter which is not permissible in publications of the second class, might destroy the statutory character of the publications and consequently jeopardize their second-class mailing privilege.

An Explanation of the Chemical Terms Applying to the

Analysis of Soaps

and Soap Products

By **R. W. BOEDECKER**
Colgate-Palmolive-Peet Co.

TODAY more than at any other time in history textile mills are buying soaps and allied products on the basis of a definite chemical analysis, according to recent surveys of purchases. Mill superintendents, purchasing agents, and their textile chemists—recognizing the importance of knowing exactly what they use in their processing operations — demand that these processing chemicals come to them with reasonably uniform physical and chemical characteristics.

Many textile mills have, for example, facilities for analyzing these processing chemicals.

To facilitate this work in valuating the products, the following notes offer brief explanation of the chemical terms used in the analysis of soaps and soap products.

SPECIMEN LABORATORY REPORT

No..... Date.....
Sample submitted as.....
Contained in .....
M'f'd by.....
Submitted by .....
A—Moist. & Vol. Matter as.....Dry At....%
received at .....° C. ....% Basis Water
B—Anhydrous Soap (Real Soap)
C—Sod. Silicate (Ratio 1:....)
D—Sodium Carbonate
E—Other Alkali Salts
F—Free Caustic Alkali (Na_2O)
G—Salt
H—Glycerine
J—Free Fat
K—Unsaponifiable Matter
L—Total
M— (Total Alkali (Na_2O) (Dry Basis)
N— (Comb. Alkali (Na_2O) (Dry Basis)
O— (Soap Acid Anhydrides (Dry Basis)
P— (Insol. in Alc. (Dry Basis) Q—Insol. in Aq.
R— (Total SiO_2 (Dry Basis) S—Total CO_2
T—Titer, °C.
U—Saponification Val. (%KOH)
V—Iodine Bal. (Wys), (% Iod.)
W—% Rosin in Mixed Soap Acids
X—Wt. as rec'd Color..... Odor.....
Y—Fats used
Z—Remarks

....., Chemist.

CHEMICAL TERMS APPLYING TO SOAP ANALYSES

The following subject matter is in explanation of the terms used on one of our regular laboratory reports covering the analysis of soap and soap products. We offer it to assist in the interpretation of these chemical terms. We will take them, in the order in which they appear on this report form.

A—Moisture and Volatile Matter 95 *received at*....° *C.* ....%

Water—or any other matter that evaporates at temperatures slightly over the boiling point of water, or in this case 105° Centigrade is included in this figure—"Moisture and Volatile Matter."

Water is used to dissolve some of the raw materials such as caustic or carbonate alkalis used in the manufacture of soap. It is present in soap in quantities varying from 2% to 50%, depending upon the type of soap being made. Ordinary chip soap, after finishing in the kettle but before being chipped and dried, contains in the neighborhood of 30% of water or moisture. This moisture or water content can be reduced in some cases to 5% or 6% by various drying methods.

In the case of liquid soap any alcohol which might be present would be classified as volatile matter and included under this same heading.

In the ordinary determination of moisture, small amounts of Glycerine and some types of fatty acids are also Volatilized and would be included in the determination. This figure would approximate only ½% or less.

B—Anhydrous Soap—(Real Soap)

This represents the sum of the combined alkali calculated to sodium oxide Na_2O and the fatty anhydrides. (See notes on combined fatty acids.) It represents a

theoretical 100% pure soap and should not be confused or compared with a rough estimate of commercial character. This figure is also an index of the true soap value of the product in question.

C—Sod. Silicate—(Ratio 1:) (Sodium Silicate)

Sodium combines with silicate to form sodium silicate—in a number of ratios. That is—1 part of sodium will combine with up to 4 parts of silicate—to form commercial grades of the product.

Sodium silicate added to soap in proper quantities increases the detergent action of soap, and acts as a water softener.

D—Sodium Carbonate

During the course of manufacturing, the alkali used is exposed to air. Small amounts of caustic soda or potash are changed to the corresponding carbonate as a result of this contact with the carbon-dioxide in the air. The alkalis used contain small quantities of the corresponding carbonate as impurities. As a result all finished soaps unless specially treated contain carbonates in small quantities varying from 2/10th to 8/10th of 1%. Amounts in excess of 1% to 1½% can be considered added and not inherent to the process of manufacture.

E—Other Alkali Salts

Filler, builder, alkali detergents, water softeners, are some of the names used to describe chemicals other than soap which may be present in the product in question. Other Alkali Salts vary much in the percentage present and may be made up of such things as Tri-Sodium Phosphate, Borax, etc.

With the facilities of a modern laboratory these things are easily detected. Few manufacturers deliberately add them to cheapen the product with the idea of fooling the consumer. They are added to soap and soap products as "Builders" or detergents and the product is sold on the particular basis which results from their addition. They are soluble compounds and have in combination with soaps, detergent properties which cannot be denied. Starches, Insoluble Silicates, etc., when incorporated in large amounts are more or less deliberate attempts at adulterations, except in cases of grit or abrasive hand soap or scouring mixtures. In these, the Insoluble matter is added for its abrasive action.

Preservative

Pure soaps, under some conditions of storage, are affected by temperature and humidity, insofar as their keeping qualities are concerned.

Small amounts of Soda Ash and Sodium Silicate are sometimes added (one or two per cent) to improve the keeping qualities of pure soap, to act as preservatives. The substances added have detergent value, the percentages used are small and the practice is considered ethical and followed by the majority of manufacturers.

F—Free Caustic Alkali (Na_2O)

This may be present in the form of Caustic Soda or Caustic Potash, depending on the type of soap in question. These alkalis are used to saponify the fat stocks and in the early stages of manufacture, are present in quantities in excess of the amount required. By proper control in the finishing operations the free caustic alkali is held, in most cases, to less than .20%. Its presence in quantities greater than this are an indication of either deliberate addition of this alkali or lack of control in the manufacturing process.

The Na_2O means simply the free caustic alkali has been calculated from the analysis as sodium oxide—instead of sodium hydroxide. As sodium oxide it can be included directly with the balance of the figures to total 100%.

G—Salt

Salt appears as an impurity in the alkali used in soap making. Its presence here is so small, however, as to be negligible. In boiled soap, however, salt is used as a means of graining or salting out the impurities, excess alkali, etc., in the saponifying and finishing process. It is economically impossible to remove the last traces of salt from commercial boiled soap, so it appears in the finished soap in quantities up to 1%. While it has no detergent action, in these small percentages it has no appreciable effect upon the detergent value of the soap.

H—Glycerine

The fats and oils used in making soap are chemical combinations of glycerine and fatty acids. During the course of manufacture the oils and fats are separated into their constituents of glycerine and fatty acids. The fatty acids combining with the alkali (in the form of Caustic Soda or Soda Ash or the corresponding Potash Salts) to form soap, the glycerine being separate in the free state along with any impurities. In boiled soap the glycerine is separated out in the changes of spent lye, separated by the salt used and is recovered and refined for sale. Soaps of the hard water cocoa type, classified as cold made soaps, contain whatever glycerine is present in the original fat stock. This process does not permit of its removal. In boiled soap it is economically impossible to remove the last traces of glycerine from the finished soap. Therefore, it appears in commercial soap in quantities up to 1% as a maximum, and while it has no direct detergent value, its presence in these small quantities is not detrimental.

J—Free Fat

Free fat, in soap or soap products, is the result of incomplete saponification of the original fat stock or partial decomposition caused by age, usually under poor storage conditions.

It has no detergent value and its presence may be a detriment in that it sometimes causes the development of a bad odor in washed materials. There are, however, as exceptions to this, some types of special soaps which contain free fat or fatty acids, saddle soap, as an example, some wool fulling mixtures, also, soaps of the hard water cocoa type.

K—Unsaponifiable Matter

Fats and oils besides fatty acids and glycerine, which

(Continued on page 712)

The Iodine Number of Wool

By **R. W. McKAY**
Textile Department, Ontario Research Foundation

IN VIEW of the commercial importance of chlorination of wool in producing an unshrinkable finish, observations on the reaction of another halogen with wool are of interest. In a recent paper[1] in this journal, Harris, Neville and Fritz gave measurements of "iodine numbers" for wool, other proteins, and some amino acids and related substances. For silk fibroin, wool keratin, and a commercial brand of food gelatin, these authors found that their results could be explained by assuming that the iodine formed additional products with the free amino groups of the proteins. In the case of wool they made a correction for the oxidation of an unknown amount of cysteine which may be present.

This work forms part of an investigation of the reactions of chlorine and related substances on wool in producing an unshrinkable finish. The "iodine numbers" reported by Harris, Neville and Fritz are approximately confirmed, but it is shown that the stoiciometrical relations found by these authors between iodine number and free amino nitrogen are of an accidental nature. If this method is used as an index of the progress of reaction of various chemicals on wool the empirical nature of these "iodine numbers" should be recognized.

In connection with work being carried on here on the action of halogens on wool, we have occasion to repeat some of the experiments of these authors and to supplement them by experiments in which the time of reaction and the concentration of the solutions used were varied. The method of treatment used by Harris, Neville and Fritz was followed. Samples of wool extracted with ether and alcohol, washed and dried, weighing 0.5 grams, were shaken with 25 cc. acetic acid and 25 cc. Wijs solution (iodine monochloride in glacial acetic acid) in glass stoppered bottles for a definite length of time. At the end of the time water and potassium iodide and an excess of sodium thiosulfate were added without removing the wool and the flasks were allowed to stand for half an hour. By this time the wool samples were completely white again. The excess thiosulfate was then titrated with tenth normal iodine and the amount of halogen which had been removed from the solution by the wool was calculated.

The results obtained here are compared with those of Harris, Neville and Fritz in Table I. The agreement for the simple amino acid glycine and its hydrochloride is good, and the disagreement in the case of wool is small considering the fact that wool from a different source has been used.

The wool was treated with nitrous acid by immersing in an 0.1% solution for three hours at room temperature.

Further determinations were made in which the conditions were modified. In one series, the time the wool was left in contact with Wijs solution was varied from half an hour to four hours. The results of this series are shown in Fig. I. In the other series concentrations of Wijs solution varying from 0.04 N to 0.24 N. in total halogen were used. The results of this series are shown in Fig. II. In Fig. III are shown the results of an experiment in which the wool sample, weighing 1 gram, was soaked in 200 cc. of 0.1 N Wijs solution. The concentration of the solution was measured at intervals on 5 cc. samples from the flask. The two curves show the decrease in concentration of the solution and the weight of halogen absorbed (expressed as iodine) after varying intervals of time. It will be noticed that after 72 hours the wool has removed from solution more than eight times the amount of halogen which Harris, Neville and Fritz give as equivalent to the amino groups and cysteine. The assumption that cysteine is present is not in agreement with the results of Rimington[2] who finds that prac-

TABLE I

Substance	Iodine Number — *Harris, Neville and Fritz*	*Author*
Wool (64's Merino)		12.7
Wool	14.2	
Wool (treated with nitrous acid)	4.7	4.3
Glycine	15.5	16.0
Glycine hydrochloride	0	0

[1] American Dyestuff Reporter, XXIII, June 4, 1934, p. 323.
[2] C. Rimington. Biochem. J. *23*, p. 41, 1929.

tically all the sulfur in hydrolysates of wool is in the form of cysteine. Speakman[3] and Astbury[4] also use the double sulfate linkage of cysteine to account for the structure of the keratin molecule so that further justification would seem to be required for stating that cysteine is a constituent of the wool.

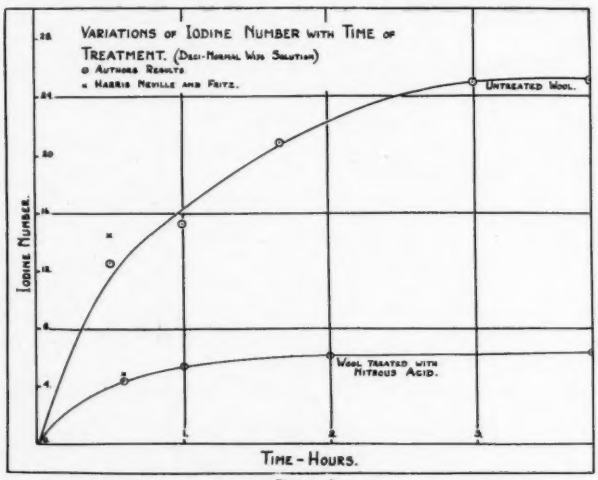
VARIATIONS OF IODINE NUMBER WITH TIME OF TREATMENT. (DECI-NORMAL WIJS SOLUTION)
o AUTHORS RESULTS
x HARRIS NEVILLE AND FRITZ.
UNTREATED WOOL.
WOOL TREATED WITH NITROUS ACID.
IODINE NUMBER.
TIME - HOURS.

Figure I

If the amino nitrogen reacts quantitatively with the iodine, and the excess iodine taken up when strong solutions or long soaking times are employed is due to some additional reaction, then wool samples treated with nitrous acid should show a constant difference in "iodine number" from the samples not treated with nitrous acid, when soaked in Wijs solution under the same conditions. This, however, is not the case as the lower curve in Fig. I indicates.

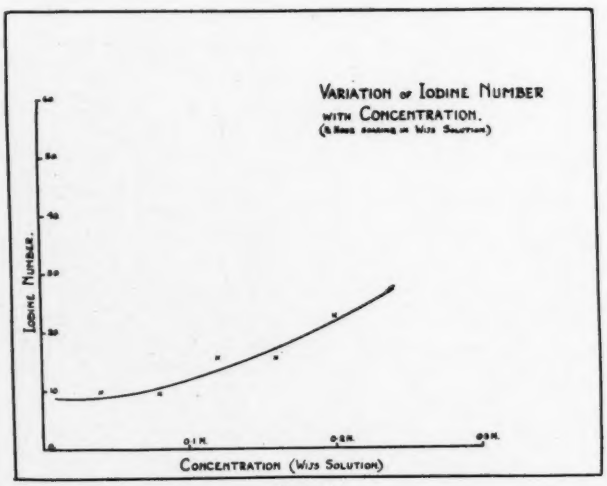

Figure II

Wool samples were treated with nitrous acid: (1) in 0.1% solution for three hours, and (2) in 0.5% solution for twenty hours. No difference was found between the "iodine numbers" for the two methods of treating, in agreement with Harris, Neville and Fritz. It is difficult to get consistent results with wool treated with nitrous acid since the wool, although washed in running water for 24 hours, still contains some nitrous acid which reacts with the potassium iodide, liberating iodine slowly. A blank determination showed that the "iodine number" was decreased by 1 or 2 units due to this reaction.

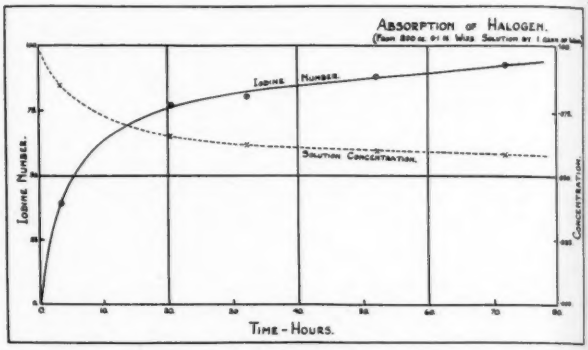

Figure III

The results for 0.1 normal solution for half an hour correspond with the results of Harris, Neville and Fritz for which stoiciometrical relations were found. However, for longer times or higher concentrations, the "iodine number" is much larger and cannot be explained on the basis of reaction with free amino groups. However, the absorption of iodine from solution is shown to be related to the amino groups by the fact that nitrous acid and various other reagents which attack amino groups have been shown by Harris, Neville and Fritz to greatly reduce the "iodine number." If, however, as suggested by these authors, the iodine reaction is used as an index of progress of the attack of various chemicals on proteins, the arbitrary choice of conditions must be considered. The method may have some value but the results are empirical at best.

[3] J. B. Speakman. Nature, *132*, p. 930, 1933.
[4] W. T. Astbury. Phil. Trans. (Roy. Soc. of London.) *A232*, p. 333, 1933.

● GEIGY CIRCULAR

Geigy Company, Inc., announces distribution of Circular No. 257-D which shows a range of dyestuffs for acetate which leave rayon clean. The various members of this range are illustrated on a combination acetate and rayon fabric which indicate how the rayon is left clean. It is stated that in order to obtain best results, it is necessary to aftertreat after dyeing. Complete instructions are given. Copies of this circular are available upon request.

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December 17, 1934

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Members should notify the **Secretary** immediately of all address changes

FOURTEENTH ANNUAL MEETING

HENRY F. HERRMANN
Chairman, Arrangements Committee

One of the most successful meetings in the records of the Association was held at the Hotel New Yorker in New York City on December 7th and 8th. The success of the meeting was due largely to the activities of the New York Section and especially the members of the arrangements committee. The chairman of this committee should feel gratified at the excellent showing made at this convention. The chairman of the technical program committee also is deserving of praise for the excellent quality of the technical program presented.

Perhaps the largest attendance in the history of the Association enjoyed the Annual Banquet on Saturday in the main ball room.

CARL Z. DRAVES
Chairman, Technical Program Committee

Among the speakers at this time were President Robert E. Rose, Past President Louis A. Olney, Dr. Charles H. Herty and Q. Forrest Walker. A. R. Thompson, Jr., also spoke briefly on behalf of the graduates of the Lowell Textile Institute and expressed their gratitude to Prof. Olney. Ephraim Freedman, chairman of the New York Section, welcomed the members and guests and P. J. Wood, also a past president of the Association, acted as Toastmaster.

Complete stenographic details of all papers presented, addresses delivered and discussions held will appear in future issues of the REPORTER.

MEETING, NORTHERN NEW ENGLAND SECTION

A REGULAR meeting of the Northern New England Section was held Nov. 16 at the Hotel Vendome in Boston with an attendance of 75. Following the usual dinner, Chairman Derby led a brief business session.

A paper on "The Determination of Calcium Soap on Textile Fibers" was delivered by Dr. B. H. Gilmore, Fellow of The Mellon Institute of Industrial Research. A lively discussion was aroused by this important subject.

Dr. Gilmore's paper has already appeared in the Nov. 19th number of the DYESTUFF REPORTER. The ensuing discussion follows.

Respectfully submitted,

CLARENCE L. NUTTING,
Secretary.

Discussion

Mr. Derby: I'd like to ask just how close the results with the three extraction methods came to his extraction with the alcohol-benzene method, that is, the extract with ether, alcohol and acidified ether.

Dr. Gilmore: I do not have any direct comparative figures to give between those extractions and the method which I have applied here. However, I have some figures which represent the analysis of some mill samples as obtained by the application of the benzene alcohol solvents. I would be very glad to present those figures at this time, if I might have the last table.

Determination of Calcium Soap on Mill-Scoured Tops

(Expressed in mg. per 10 gram sample)

	A	*B*
Total extract	147.7	351.2
Total organic extract	138.7	332.4
Free fatty acids as oleic	34.9	91.9
Total fatty acids	48.9	101.2
Oil and Wax by difference	89.8	231.2
Calcium Extracted—		
As Ca	1.59	1.3
As Ca $(01)_2$	22.50	18.5
Residual	9.4	1.7

I wish to say at the beginning here, that no comparison is intended to be drawn between samples represented by A and B as to relative scouring efficiency. They were more or less random samples to me. One of the samples I understand was scoured by a solvent extraction process, the other by a soap extraction process. Sample B had been oiled. Sample A I understand was a dry sample. The figures as I have presented them here are expressed in mg. per 10 grams sample. If you wish to convert that into %, divide the results expressed in the two columns by 100. For instance, considering sample A, the extracted calcium expressed as calcium is 1.59. In percentage that would be .0159. The next figure represents the calcium soap content expressed as calcium oleate 22.5 mgs. expressed in percentage would be .22, and for sample B, the results would be .19% for calcium oleate. Considering that one sample was solvent extracted, the source of the calcium soap may seem somewhat problematical in view of the fact that soap was not used in the scouring of this sample, however, there is ample confirmation of the existence of a calcium soap on raw wool. In fact, Matthews has commented on that fact and gives several analyses ranging from 1% to 6% of calcium soap on raw wool.

Mr. Christison: Have you a corresponding ether or tetrachloride extraction on those? Also, could not some of the fatty acids be combined as soaps other than calcium?

Dr. Gilmore: No. I haven't. However, about the existence of either soda or potash soap, most mill men agree it is almost impossible to totally rinse the soda or potash soaps from the wool. Well, it is entirely conceivable that sodium or potash soaps can exist on the fiber even after a scouring process. That fact I think is fairly well substantiated by work that has been done by the British Wool Industry Research Association. One factor which contributes to such fatty acid content of scoured wool is the reaction between soap and wool whereby the wool absorbs the alkali from the soap leaving an excess of fatty acid which may be combined to form an acid soap which is recognized as being fairly insoluble and may be redeposited on the fiber. But, it is also recognized, considering the solvent scoured sample that naturally occurring potassium soap which comes from the animal itself may exist in the raw wool. Of course, to make this analysis more complete, it would be desirable to include the actual alkali metals present in the soap extraction. It would be a very enlightening piece of work if that were done to show the partition of fatty acid between calcium and potassium, or calcium and sodium as the case might be.

Mr. Derby: Would you consider perhaps that the total extraction with a mixture of benzene and alcohol would serve as a complete extraction method for determining oil, potash and sodium soaps and calcium soap?

Dr. Gilmore: I believe that it would, but I think that the results might be of doubtful significance unless the extract itself were analyzed for oil, wax, fatty acid and the constituent metals. The value of the extract itself expressed in percentage might not be a very significant or valuable figure of itself, unless it were supplemented by a fatty acid determination.

Mr. Derby: How long would that extraction take?

Dr. Gilmore: I didn't work in the direction of seeing in how short a time it could be conducted. This was conducted for sixteen hours, but that was because of personal convenience. I started them at five and let them go until nine the next morning. It is quite possible that a briefer

extraction period might serve for some of these samples although I would hesitate to say.

Dr. Chapin: Do you think the calcium or potassium or sodium could exist in combination with the wool protein material without the necessity of any union between fatty acid and the metal?

Dr. Gilmore: As far as I know, such compounds have never been recognized or referred to in the literature.

Mr. Grady: Mr. Chairman, I would like to ask Dr. Gilmore if he has had any results on the relative effectiveness of Gardinol and Calgon in the removal of calcium salts.

Dr. Gilmore: In reply to Mr. Grady's question, I will say quite frankly that I have never had occasion to examine such samples by an analytical method. I do understand, however, that Mr. Bell has taken part in some experiments in which Calgon and Gardinol were used. Perhaps Mr. Bell has something to say on the subject.

Mr. Bell: We have run experiments using both in the same process and they worked wonderfully together.

Mr. Dalton: Supposing you had a mixture of oil and calcium soap on a fiber, what procedure would you recommend, what choice of solvents?

Dr. Gilmore: In that case, I would favor a complete extraction of oil and soap. I would favor the alcohol-benzene mixture, an extraction by the alcohol-benzene mixture followed by the determination of the fatty acids and saponifiable and unsaponifiable material. Did you have in mind mineral oil or vegetable oil?

Mr. Dalton: Either.

Dr. Gilmore: In that case, I think a saponification value in addition to the fatty acid would give you all the necessary information. Although it might be possible in that case to conduct a two stage extraction extracting oil with ether followed by benzene-alcohol for the total soap.

Mr. Dalton: Did you recommend ether or carbon tetrachloride?

Dr. Gilmore: I am not prepared to make a distinction between the solvents because I have not compared them. Although when ether is used as a solvent, there is information from some of the data I cited in the literature, that calcium oleate seems to have a certain solubility in ether, so that if ether were used in a preliminary extraction it would also be desirable to examine the oil for calcium in order to determine whether any calcium soap were extracted by the ether.

Mr. Rizzo: Can you tell us whether in the particular case you cited with ether extracting out your calcium soap whether there was oil connected with that or just calcium soap?

Dr. Gilmore: Are you referring to the mill samples?

Mr. Rizzo: No. The idea is this. Were you getting a solubility in the single solvent or in the two component system?

Dr. Gilmore: Well, the samples which I referred to were what you might consider synthetic samples. In other words, they represented clean cloth which has been impregnated with calcium soaps and which did not contain any excess fatty acid. I concede the fact that the presence of free fatty acid or oil does influence the solubility of the calcium soap, in the direction of favoring its solubility.

Mr. Christison: You differentiated between the fatty acid and the oil and wax. That is quite interesting. How did you make that differentiation?

Dr. Gilmore: Now, here is the way I got that set of figures. I first determined my total extract. I then decomposed my extract by boiling it with dilute acid. I then extracted my solution with ether and weighed the extract. I termed the ether extract total organic material. I then titrated my ether extract after taking it up in ether and alcohol and determined the total fatty acid, and what I called oil and wax in my figures was the difference between the total organic extract and the fatty acid fraction.

Mr. Christison: Then you assume a molecular weight of 282, that is, oleic acid, and your calcium was then determined in the aqueous portion?

Dr. Gilmore: That is correct.

Mr. Rizzo: Did you experiment with any other benzene-alcohol ratios than the nine to one? Doesn't it seem rather awkward to use a mixture of nine to one alcohol which represented a certain composition? Wouldn't you be getting more or less a constantly varying ratio of benzene and alcohol in that way? It would seem that the use of the nine to one would not be justified.

Dr. Gilmore: I found it justified in the literature and my preliminary experiments served to justify the adoption of that ratio. Although there is this in favor of a certain mixture of alcohol and benzene, if a mixture were taken which approached that of a constant boiling mixture, namely, the ratio of about 2 parts of benzene to 1 of alcohol, it would be possible to make an almost complete recovery of your solvent and use it constantly. Because the only contaminating factor in that case is likely to be moisture which might be extracted from the sample. Now, it happens that water, benzene, and alcohol also form a constant boiling mixture. In fact, an industrial process for making absolute alcohol is based on the dehydration of 95% alcohol by means of benzene. Since benzene forms a low boiling mixture with alcohol and water then it is possible by the proper addition of benzene to distill off all water, and practically dry out the alcohol. Nevertheless, it was possible by the use of this mixture to obtain a more effective solution of calcium stearate than by ether solvent separately. It is true that under the conditions of constant extraction that the composition of the vapor phase would change. For instance, during the period of refluxing, you would be extracting the solvent

with a constant boiling mixture and then later possibly the extraction would be conducted with pure benzene and then the mixture would syphon over and you would be extracting with the original mixture again.

Mr. Christison: One other thing, the Bureau of Standards was one of the first to discover that wool evidently forms a fairly stable compound with alcohol and perhaps the ratio of solvents to wool being treated might be poor from that point of view. For instance, if that wool-alcohol complex does form, it might be rather poor because it might change the ratio of alcohol and benzol that you are really extracting with. Have you tried to dry your wool sample after the extraction to see if that alcohol was retained the same way as it is when alcohol is used straight? Because if we extract wool with alcohol and then dry the wool, we find the wool retains the alcohol tenaciously. We can, however, wash it out readily with water and then get a true oven dry weight.

Dr. Gilmore: No, I wasn't familiar with that information.

Mr. Christison: As I understand it, benzol does not do that. We can extract wool with benzol and benzol will evaporate spontaneously and completely; but alcohol, even in an oven at 105° C. will not leave the wool.

Dr. Gilmore: That is very interesting to me. I wasn't acquainted with that fact.

Mr. Rizzo: Will you please repeat how you determined that residual calcium and fatty acid?

Dr. Gilmore: During my research I learned this. No matter how long I conducted an extraction, there was a residue of combined fatty acid which could not be extracted by my solvent but which could only be extracted by acidifying my fabric and then extracting with the solvent or extracting the fabric with a solvent which had been previously acidified by a volatile acid such as hydrochloric acid. The fatty acids so obtained were determined as oleic acid. I termed the residual calcium, the calcium which was not extractable by the solvent. It was for the most part, I consider, inorganic calcium and that was determined by ashing the sample after extracting and making a straight forward determination of calcium in the ash.

Mr. Dalton: Have you ever tried to reflux with any other solvent such as Trichlorbenzene?

Dr. Gilmore: I did not consider it because of its high boiling point. It would be rather destructive to wool. The boiling point is 218° C. In fact it would be practically impossible to reflux.

Mr. Derby: There is in the tentative standards a method of extraction supposed to remove oil and grease with petroleum ether and then follows an extraction with absolute alcohol again. The alcohol extract is supposed to be soap and in both cases it called for room temperature or the cold treatment.

Dr. Gilmore: Well, the reason for that specification was to first remove as much oil as possible with as little soap. I think that in an alcohol extraction, with soap, even a boiling temperature would be desirable to get the total soap.

Comment from floor, unknown source: We notice that if we do not full in soap but as in some cases we use acid, we could make a petroleum ether extraction and get the mineral oil and natural oils up to rather a high percent, up to three, four or five per cent and there is practically no, or at least, a rather small alcohol soluble content, but if the same material is fulled in the soap mill instead of the acid mill, they balance up so that the alcohol soluble builds up and the petroleum ether soluble comes down which would indicate that the alcohol is working on soap to a certain extent.

ATTENDANCE AT ANNUAL MEETING

It was estimated that over 750 were present at various times during the Annual Meeting. There were about 450 who registered, over 250 who attended the Friday evening supper and over 500 who enjoyed the Annual Banquet.

MEETING, LOWELL TEXTILE INSTITUTE SECTION

A MEETING of the Lowell Textile Institute Student Section was held on November 23, 1934, with attendance of about 65 members and guests.

Mr. John J. Healy, Jr., of the Merrimac Chemical Company gave an interesting talk on the "Manufacture, Handling and Transportation of Heavy Chemicals."

Dr. Chapin spoke briefly on the Association and its value to the textile student.

Respectfully submitted,

CHESTER M. KOPATCH,
Secretary.

CALENDAR OF COMING EVENTS:

Meeting, Philadelphia Section, Broadwood Hotel, Philadelphia, January 11th.

Meeting, New York Section, Chemists' Club, New York City, January 25th.

AMERICAN
DYESTUFF
REPORTER

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FOURTEENTH ANNUAL MEETING

THE Fourteenth Annual Meeting marked the completion of thirteen years of service to the textile processing industry by the American Association of Textile Chemists and Colorists and the success of this meeting indicates, in a small way, the success of the Association. The work of the committees which handled the details of this meeting is an indication, in the same way, of the spirit and manner of accomplishment of the Association. The work of the committees was confined to this convention but nevertheless it represents the type of concerted action and sincere cooperation which has marked the path of progress for the Association. In the same manner that the success of this meeting was due, in large part, to the leadership of those in charge so is the standing of the Association today a testimony to the type of leadership which has become synonymous with the Association since the time of its inception.

There is no doubt that the meeting held in New York City on the 7th and 8th of this month was one of the most successful ever sponsored by this Association,—both in point of attendance and quality of program. No one who attended this meeting could have left without gaining something that will be well worthwhile to him now or at some later date. Those who were unable to attend the meeting have missed a great deal. It is unfortunate that they were not present and the only alternative which we can offer is the report of the meeting which will appear in its entirety in the Proceedings of the Association in the near future.

We offer to the committees in charge of the convention the sincere thanks and appreciation of the membership for the splendid manner in which all details of arrangement and program were prepared and presented. They have set a goal for future convention committees to reach. We can only add that the Fourteenth Annual Meeting was a credit to the Association, the committees and the entire list of members.

MR. GORMAN AGAIN

IT WOULD appear from recent news items in the daily papers that Mr. Gorman (best known for his connections in the last general textile strike) is preparing for another membership drive which, by the way, is practically all that the last strike amounted to. At that time he claimed a membership entirely out of proportion to the figure it was later shown to be.

After the failure of the last strike (in spite of Mr. Gorman's claims to victory) we doubt very much if he will ever accomplish much in the way of completely organizing the textile workers into one union to do his bidding. We believe that they learned their lesson from the last strike and very thoroughly learned it too. The last strike was supposedly called because of the demands of the workers. Just how strong these demands were was shown by the fact that most of them had to be forced from their jobs by various "flying squadrons" and the like. And after it was all over all that the laborers gained was an enforced vacation without pay but with suffering.

At the present Mr. Gorman is stating that the workers are again demanding a strike but in the face of what happened at the last strike it just shows that such a statement has little or rather no foundation at all. In the sections where the demand for a strike was supposed to be most urgent last September we now find perhaps the bitterest feeling against the union. A great many workers have cancelled their memberships. Such an action cannot possibly show anything except loss of faith in the union and in Gorman.

We cannot conceive of any active support being given to Gorman should he issue the call for another of his self-made strikes. We believe that the workers have had plenty of Gorman and his tactics. The majority of them are satisfied to get whatever is coming and in return to give honest labor. As a rule they would rather work and live than loaf and suffer and will only do the latter when forced into it.

• DESIGN CONTEST

Contests for designs to be used in silk decorative and dress fabrics, awards for which are being offered by the International Silk Guild, were formally announced recently to pupils in the day and evening textile classes of Straubenmuller Textile High School, and to the day classes in Washington Irving High School and Girls' Commercial High School. Winners will be announced at a public exhibition of the designs, opening on January 14th.

One contest in the schools is for a printed colored design for silk dress fabric; the other for an artist's sketch for a woven design for silk decorative or dress fabric. In the evening school the contest will concern woven design only. The contests are part of a present movement to stimulate American design in silk decorative and dress fabrics.

Awards offered in each division are a first prize of $75, a second prize of $50 and a third of $25, with twelve honorable mentions at $5 each in the day classes, and several honorable mentions to evening class contestants.

Judges for the contests, which will close January 11th, are Mrs. Helen Appleton Read, art critic of the Brooklyn "Daily Eagle"; Miss Dorothy Shaver, vice-president of Lord & Taylor; Richard F. Bach, director of Industrial Relations, Metropolitan Museum of Art; Ely Jacques Kahn, architect; Ward Cheney of Cheney Bros.

• WARP SIZING

A plan for the scientific study of warp sizing has been prepared by U. S. Institute for Textile Research, Inc., that is based in large part upon the findings and recommendations of the conference on this subject held by the Institute in New York City last May. The December issue of the Institute's monthly magazine, *Textile Research*, states that this study is to be financed cooperatively, and participation will be confined to a group of not more than 50. This group will receive confidential progress reports prior to publication of the final results, and will qualify for other important privileges. Invitations to join the group have been mailed to those who participated in the New York conference, and will later be addressed to others who should be interested. Secretary Clark has charge of the latter work, and will be glad to mail a prospectus of the plan to inquirers, pending completion of the group. He can be addressed at 65 Franklin St., Boston, Mass.

• RAMIE

Science has discovered why it is that ramie, or China grass, while one of the glossiest and apparently one of the strongest of the natural textile fibers, has thwarted efforts to utilize it on a large commercial basis. In China and the Far East it has been prepared and spun by hand labor for centuries. Millions of dollars have been spent in attempts to perfect chemical and mechanical methods of decorticating and degumming the fiber, but none have been successful on a commercial scale. The fiber, and yarns and fabrics produced therefrom, have always proved to be weak when subjected to bending and torsion sharply angular to the yarn axis. This was assumed to be a fault of the methods used in preparing the fiber for spinning, but scientific research has proved that it is due to faults in the micellar structure of the fiber, that are strikingly similar to geological faults.

This discovery was made by G. Gordon Osborne, a Textile Foundation fellow working under the direction of Prof. E. R. Schwarz at Mass. Institute of Technology, on Micro-Analysis of Textile Fibers. Ramie's brittleness, lack of resistance to flexing, and low-extensibility are due, according to Mr. Osborne's findings, to trans-fiber fissures which vary in depth, and of which several may be found in one cross-section of the fiber. "Mechanical action," he reports, "starts and intensifies the formation of these markings and, as treatment proceeds, the number of trans-fiber fissures increases."

• pH TESTING

A booklet has been released by Pfaltz & Bauer, Inc., which is entitled "pH Testing by the Indicator Strip Method." It describes a method of pH testing which is said to avoid all difficulties met with in testing highly colored, turbid, viscous, or semi-solid mediums which are the types of solutions generally met with in most industrial process. Copies of this booklet are available upon request.

• METALLURGIST

Thomas T. Watson, who joined the Metallurgical Department of Lukens Steel Company, Coatesville, Pa., in August, 1931, has been appointed Development and Service Metallurgist. He will be engaged principally in service and sales work in connection with Lukens Nickel-Clad Steel.

Mr. Watson was born in Scotland thirty-five years ago and graduated in 1923 from the Royal Technical College in Glasgow with the degree of Associate of the R. T. C. Until 1925 he was Assistant Metallurgist at David Colville & Sons, the largest iron and steel manufacturer in Scotland. He then became the Metallurgist at the Clyde Alloy Steel Company, serving there for two years under Dr. A. McCance, Managing Director. From 1927 to 1930 he was Assistant Metallurgist at Dorman Long Company, one of the largest iron and steel manufacturers in England. He came to this country in 1930 and engaged as a Consulting Metallurgist in New York until he joined the Lukens organization in 1931.

A Concise Compendium of the

Textile Solvents

By **A. H. P.**

ONE of the difficulties which anyone who wishes to study finds himself up again today is not the lack of availability of technical information, but the overwhelming superabundance of it. Having made a start with his reading he very soon finds himself snowed under with data and it is no small wonder if he loses his sense of direction altogether. To take the case of solvents, the average technologist has a mild interest in them, but since they are being increasingly used in the textile interest it is important that the practical possibilities in the newer solvents should at least be appreciated. When it is remembered that about twelve new solvents are "discovered" every year it is no small wonder that the subject becomes complex, however.

The present account aims at describing the distinctive features of each solvent at the risk of omitting several of the more ordinary properties. Endeavor has also been made to concentrate only on the textile uses and little regard has been paid to the interests of the paint and varnish trade from which angle most accounts of solvents are written. Convincing proof of the applicability of solvents in textile processes such as dyeing and printing is afforded by the many patents referred to.

Acetone—is the well-known solvent for cellulose acetate and esters of cellulose. It is a dangerously inflammable liquid boiling at 56.5 deg. C.

Amyl Acetate finds a little application in textile processes as an ingredient of wetting-out agents. A mixture of benzine, alcohol and amyl acetate is stated to be capable of dissolving any dye.

Aniline—is a solvent of cellulose acetate but not for nitrocellulose.

Benzene, Benzol—is a chemically distinct substance obtained from coal tar and having the formula C_6H_6. It boils at 80.5 deg. C., dissolves grease, wax, sulfur, etc. Carefully distinguish it from

Benzine or Benzoline which consists of long chain hydrocarbons such as hexane and heptanes. These have their origin in petroleum and are of variable boiling point. Benzene burns with a very smoky flame whereas petroleum solvents burn clean.

Carbon Tetrachloride, B. Pt., 77 deg. C. On account of its power of dissolving grease yet being non-inflammable, it is used for dry-cleaning. It may be safely used on acetate rayon. Has been proposed (Brit. Pat. No. 119,881) as a dry-dyeing medium. Bitumen and resins of the coumarone, thiourea type, dammar and mastic are soluble but shellac and copal are not soluble. In the presence of moisture carbon tetrachloride is unstable and corrodes metals. In large doses it is toxic to human beings.

Cyclohexane. When benzene is hydrogenated, this compound is produced C_6H_{12}. It is a liquid with a mild ethereal odor and boils at 81 deg. C. In the fine chemical industry it is used for recrystallizing organic compounds. Rubber and paraffin wax are readily dissolved.

Cyclohexanol and Methylcyclohexanol. B. Pt. 160-180 deg. C. These are non-toxic but excellent fat, wax and basic dye solvents. Capable also of dissolving dyes for acetate rayon of the Duranol class. Have no action on acetate and nitro silk. Much used in the preparation of textile soaps as they confer resistance to lime soap formation.

Cyclohexanone and homologues. Boiling range, 154-156 deg. C. This is the solvent for cellulose ethers which gives the least viscous solutions and takes up two or three times as much as the others. Will dissolve nitro and acetate cellulose, basic and vat dyes and also waxes. It is a useful wetting-out agent. Added to oil varnishes it reduces viscosity very considerably and so is used for thinning. It is the only solvent in which nitrocellulose resins and coumarone resins will blend in one lacquer. Bitumen dissolves in this solvent and also it may be used for removing paint.

Cyclohexanol Acetate. Boiling range, 170-176 deg. C. This non-toxic, non-inflammable grease solvent is unique as being safe for spotting on acetate rayon while the other cyclo compounds are not. It will dissolve crude rubber wax and is the only solvent for Dammar resin when it has not been dewaxed. Nitrocellulose is soluble. It will not mix with water.

Diacetone Alcohol $(CH_3)_2$: C(OH) — CH_2. CO. CH_3 B. Pt. 160-170 deg. C. This solvent possesses stability to acid and alkali, little odor and a low rate of evaporation. Nitro and acetate cellulose are soluble and a number of dyes, particularly baics, readily dissolve. Hence it has found employment in the printing of basic colors. It is a good solvent for shellac.

Dioxane. 1 : 4 *Diethylene Oxide* is mixible with water in all proportions and also with oils, vegetable and mineral. Used as a coupling agent for oil emulsions. Cellulose acetate is soluble.

Ethylene Dichloride. $C_2H_4Cl_2$ B. Pt. 83.5 deg. C. Of all the chlorinated hydrocarbon solvents this one is the most stable and able to withstand 8 hours' boiling with water. It is an excellent solvent for grease and even paraffin wax, but has a softening action on acetate rayon. Tar marks on wool yield to its application. Has been protected (British Patent No. 297,848) for assisting the penetration of vat colors in the dyeing and printing of rayon. In admixture with carbon tetrachloride has been applied to the fumigation of insect-infested places. (Hoyt. Ind. and Eng. Chem., 1928.) It will dissolve indigo.

Ethyl Lactate. Boiling 145-160 deg. C. Few modern solvents offer so many possibilities in the dyeing and printing of cotton and rayon. It is non-inflammable, non-toxic and mixible with water. Has very great stability towards acids and alkalis. Readily dissolves fats, oils and rubber. British Patent 318,176 claims to get better and faster prints on cotton with vat colors if such a compound is added in amount insufficient to dissolve all the dye.

Ethylene Glycol is used in textile printing as a solvent for dyes, and as a conditioning agent in finishing. Causes the swelling of rayon and wool. It is not so sticky as glycerin and flows more easily. Brit. Pat. No. 373,212 mentions its use in connection with the printing of sulfur dyes on cotton.

Ethylene Glycol Mono-ethyl ether. HO—CH_2—CH_2—O—CH_2—CH_3. Recommended for removing lacquer, bloodstains and tar from fabrics. Is a powerful solvent for nitrocellulose. It is a good solvent for acid, basic, vat and lake colors and enables excellent penetration to be obtained in the dyebath if the colors are dispersed by this medium.

Diethylene Glycol. HO. CH_2. CH_2. O.CH_2. CH_2. OH. is notable on account of its extremely hygroscopic nature, surpassing that of glycerin. It is used in print pastes as a solvent and to render them non-drying as well as being employed in finishing. Experiments have been tried using it for oiling and lubricating wool, and its use is attended with less fiber breakage. Improved color brilliance is claimed by Messrs. Ellis and Olpin of British Celanese, Ltd., in a recent patent. (Brit. Pat. Nos. 400,643 and 400,666, 1934) as an assistant in printing cellulose ester rayons. Has been recommended as a substitute for alcohol in analytical processes such as Saponification value.

Diethylene Glycol Mono-ethyl ether. HO. CH_2. CH_2 O. CH_2. OC_2 H_5. Is a good solvent for reduced vat dyestuffs and other dyes.

Methylethyl Ketone is a liquid boiling at 81 deg. C. capable of dissolving nitrocellulose but not acetate.

Perchlorethylene, Tetrachlorethylene C_2 Cl_4. B. Pt. 119 deg. C. This excellent, non-inflammable grease solvent is little used but is eminently suitable for cleansing rayon goods of a very delicate nature. It is absolutely safe to acetate silk and also has no effect on the color however long a time it is in contact. Said to be suitable for dry cleaning white goods. Has great stability but must be protected from sunlight. Its use is protected in Brit. Pat. No. 395,517.

Petroleum Ether is the general name applied to distillates prepared from petroleum and boiling at comparatively low temperatures. They are readily volatile and used for removing grease and oil from textile materials in the laboratory.

Trichlorethylene. B. Pt. 87 deg. C. Probably one of the best grease solvents in everyday use. Will dissolve resin, bitumen and is useful for removing tar and grass stains from fabrics, being about the only one which will do this. It is extensively used in the degreasing of metals and dry-cleaning. Is recommended by the British Celanese, Ltd., for cleaning and spotting cellulose acetate goods. The rate of volatility is high but it is non-inflammable. Trichlorethylene is more stable than carbon tetrachloride but must not be exposed to sunlight for it decomposes. Dyed acetate rayon goods suffer in color from prolonged contact with the solvent. As a means of removing pitch and coloring matter from wool consult Brit. Pat. No. 401,525.

Triethanolamine. This compound is a weak organic base and is capable of uniting with fatty acids to form a soap containing no alkalis but possessing first class emulsifying properties. Will aid the dissolving of certain acid dyes. Used as an assistant in vat dyeing, it enables satisfactory reduction and uniform prints to be obtained (I. G. Farbenindustrie, U. S. Pat. 1,705,818, 1929). Prevents alkali destruction of wool in the application of vats. (Brit. Pat. No. 320,978.)

No account of recent advances in solvents would be complete without mention of a new method of preventing decomposition of chlorinated hydrocarbons, (such as carbon tetrachloride) under the influence of moisture and heat. Messrs. The Dow Chemical Co., Ltd., Midland, Michigan, U. S. A. (Brit. Pat. No. 401,210), claim an organic mercaptan, for example, N-butyl mercaptan in the proportion of 0.005 per cent so reduces the hydrolysis of carbon tetrachloride and prevents the liberation of free acid that the corrosion of the iron and copper surfaces of containers, etc., is enormously reduced. The decomposition due to rays of sunlight is also prevented by this addition.

Technical Notes from Foreign Sources

Uviol-Tests with Pyridine; the Photopyridine Dyestuffs

H. Freytag—Monats. f. Textil-Ind. 48, 107 *and* 130 (1933).—A paper in two parts, upon certain phenomena encountered in the examination of dyestuffs (on the fiber), moistened with pyridine, under radiation from the Uviol lamp.

The author has already shown, in other papers, that the oxidation of certain primary aromatic amines, and of some tannins, which leads to the formation of colored substances, even "dyestuffs", is greatly accelerated by Uviol radiation, both in the presence or absence of oxidizing agents and reducing agents, and that, by localization of the irradiation by means of photographic negatives or stencils, cotton weaves impregnated with suitable sensitive substances can be imprinted in color. Such ideas are at present of only interest, though not slight interest, and if they ever attain actual practical use, much work will have to be done still before any definite methods can be prescribed. What has seemed of more importance at present is the determination of what wavelength is responsible for the most active influence upon the compounds studied, and investigation of the nature of the substances formed by irradiation. The author has, in his recent work, concentrated his attention upon the reactions of pyridine under Uviol radiation.

Pryidine itself, in the liquid condition, is altered by the Uviol rays; a yellowish-brown substances is formed: in alcoholic solution, it yields a more yellowish substance with a weak greenish cast. If paper or a cotton weave is impregnated with a solution of pyridine in alcohol, dried superficially, and irradiated, it becomes colored, first yellow, then brownish-yellow, and finally a coffee-brown. This brown substance is called by the author "photopyridine". In hot, acid solutions of primary aromatic amines, it reacts either immediately or in a few seconds, forming dyestuffs, which the author calls "photo-pyridine dyestuffs". The substances studied are deep-toned dyestuffs, red, yellow, blue, orange-brown, lilac, violet; they react with caustic soda solution, changing color to yellow or orange—a fact which makes them interesting from the chemical standpoint, but undesirable as to their possible value as dyestuffs. The color returns to its original tone with acids. Fabrics dyed with these colors are not fast to hot water; the color is more or less rapidly destroyed. The author refers by way of illustration to the so-called "pyridine dyestuffs", in whose formation a cleavage of the pyridine ring takes place, the products coming out as derivatives of plutaconic dialdehyde, these dyestuffs are also of no use technically, because of their sensitiveness to acid and hot water.

(Part II)—The author has endeavored to find some way of making dyeings from the dyestuffs more fast, by aftertreatment. As they behave like substantive dyestuffs, the action of copper sulfate, bichromate, formaldehyde, and aluminium salts upon them was studied, but with wholly negative results. Attempts to diazotize upon the fiber, and to develop with second components, were also fruitless. But treatment of the dyeings with solutions of diazotized amines was more promising. Such developed dyeings withstood washing with soap and alkalies, treatment with acids, and ironing; in cases where the colortone was slightly altered by treatment with alkali or acid, it was restored completely by treatment with acid or alkali.

The author designates the untreated photopyridine dyestuffs as of Order I, the developed ones as of Order II.

The process of printing is briefly as follows; the goods are wetted out in an alcoholic solution of pyridine (1 to 3% according to the grade of alcohol used), then removed, and allowed to drip for a few minutes, and laid upon a clean glass plate, and the alcohol allowed to evaporate; when this is nearly gone, which can be recognized by the development of the strong pyridine odor, the swatch is covered with a stencil of cardboard, and exposed to the Uviol radiation. As thus carried out, only a stencil can be used, not a glass negative, which absorbs most of the radiation which the author has found to be effective (254-266 milli-mus). The lamp is adjusted at a distance of 30 to 50 cm. from the swatch. A development of color is evident almost at once; after 30-45 minutes, the coffee-brown color has reached its maximum. The swatch is then immersed in a hot, acid, 2-3% solution of a primary aromatic amine, and left there until the photopryidine color of Order I is completely formed (10-40 seconds). Some of the colors show a tendency to bleed out; the swatch is therefore withdrawn and immersed in warm water of 20°-30° C., containing a little HCl, in order to remove excess of the amine, which is what apparently causes the trouble. It is left here for five minutes, and then, without being rinsed, introduced into a solution of a diazotized amine, whereby the color of Order II is developed. This coupling always involves a change of colortone.

Any real understanding of the nature of the dyestuffs, except that they prove, upon analysis by Green's method, to be azo colors, has not yet been reached.

Vat Dyestuffs (Anthraquinone Series)

German Patent No. 469,135 (3/XII/'28)—*I. G. Farben-Ind. A.-G.*—By fusing 1-hydroxyanthraquinone with caustic potash, or with a mixture of it with caustic soda (G. P. No. 167,461), a substance is formed which has been determined by Scholl as 1'-dihydroxy-2-2'-dianthra-

quinonyl. The present patent produces this and some allied compounds more easily by treating the monohydroxy compound mentioned, or its derivatives, with caustic alkali in the presence of organic solvents or suspension-media, at a considerably lower temperature, preferably in the absence of oxygen. Four examples are given, the products being vat dyestuffs.

Vat Dyestuffs for Wool

German Patent No. 462,798 (18/VII/'28)—*I. G. Farben-Ind. A.-G.*—The process protected consists in condensing 1-8, 1-7, or 1-6 diamino-anthraquinones with a-naphthoquinone or its derivatives, the dinitro compounds being employed either pure or in mixture (i.e., as obtained by vigorous nitration of anthraquinone, and separated by their greater solubility, in many solvents, from the 1-5 isomer, they may be used in such a mixture to save tedious separation by fractional crystallization). The condensation products dye wool in strong tones. One example is given; 12 parts of 1-8-diamino-anthraquinone and 18 parts of a-naphthoquinone are heated at 100° C. for 12 hours with 120 parts of glacial acetic acid; the product is filtered off on cooling. It dyes wool a strong reddish brown.

Vat Dyestuffs (Perylene Series)

German Patent No. 475,298 (23/IV/'29)—*Compagnie Nat. Kuhlmann, etc., in Paris.*—Several patents have already been granted bearing upon dyestuffs derived from perylene quinone, the usual process consisting in fusion of the quinone with anhydrous aluminum chloride at an elevated temperature, the yield of dyestuff being improved by addition of oxidizing agents to the mixture. The present process covers the treatment of 3-9-dibenzoyl-perylene or its homologues, etc., in sulfuric acid solution, at a moderate temperature, with manganese dioxide or manganic sulfate, in the presence or absence of boric acid, the products being capable, if desired, of acylation or alkylation. Five examples are given. The tones are in the deeper range—red-violet, olive-green, etc.

Vat Dyestuffs (Benzanthrone Series)

German Patent No. 473,163 (14/III/29)—*I. G. Farben-Ind. A.-G.*—This procedure covers the treatment of either benzanthrone with the bz-1-position free, or containing in that position substituting groups involving sulfur or oxygen atoms, or halogen, with acyl halogenides, in the absence of condensing or strongly catalytic agents; in some cases in the presence of neutralizing compounds, the products being then subjected to acid hydrolysis, and, if desired, to simultaneous or subsequent oxidation. Seven examples are given.

Vat Dyestuffs (Pyranthrone Series)

German Patent No. 471,040 (6/II/'29)—*I. G. Farben-Ind. A.-G.*—The reaction involved in this procedure consists in condensing poly-halogenated pyranthrones with nitrogen compounds which also contain a reactive hydrogen attached to the nitrogen. The process is best carried out in the presence of high-boiling solvents or suspension-media, in the presence or absence of catalysts or neutralizing agents, or both together, The result is, that one or more of the halogen atoms is replaced by radicals bearing nitrogen (those of amines, for example). The products are quite different from those obtained from mono-halogenated pyranthrones.

Four examples are given; the tones produced by the products are deep—violet-black, deep black, etc.

Vat Dyestuffs (Anthradianthrone Series)

German Patent No. 470,949 (5/II/'29)—*I. G. Farben-Ind. A.-G.*—meso-Anthradione substitution products, if the substituting groups or atoms are of negative nature, are reactable with compounds containing nitrogen, of such nature that there is at least one reactive hydrogen attached to the nitrogen (amines, for example). The reaction is carried out in the presence or absence of catalysts or neutralizing agents (to take care of the halogen acid which is split out) or in the presence of both, in the presence preferably of solvents or suspension-media. meso-Anthradione itself and its derivatives are already vat dyestuffs, dyeing cotton in tones in the yellow region of the spectrum. By the present process, the products dye in deeper tones, even up to dark violet. The reaction can be so controlled, that the halogen atoms in the nucleus can be replaced one by one, thus affording a considerable range of products, more or less heavily substituted and so more or less deep in tone.

Vat Dyestuffs (Benz-dianthrone Series)

German Patent No. 471,039 (6/II/'29)—*I. G. Farben-Ind. A.-G.*—The present patent in its general procedure is very like the two preceding, consisting in the reaction of the negatively-substituted meso-benzdianthrones (halogenated) with such compounds as amines (compounds containing nitrogen, to which nitrogen is attached at least one reactive hydrogen atom); and, as before, under various conditions, with or without solvents or suspension-media, in the presence of catalysts or neutralizing agents (for the halogen acid set free in the reaction), or in the presence or absence of both. ms-Benzdianthrone and its derivatives are vat dyestuffs to start with, but they yield for the most part week, yellow tones. The halogenated derivatives are a little better as to depth of tone. The products of the present patent, however, dye deep tones, dark violet, grayish blue, gray, and copper-red. The process of replacing the halogen by the heavier substituting groups can be carried out step by step, thus yielding a good range of gradually varying products.

Eight examples are given.

Algae and their Uses

Dr. A. Beyer—TIBA 10, 493 (1932).—The concluding section of the paper (a previous part has been noted in

these columns). After mentioning the uses of the algae and alginates in reference to food and medicinal values, and for agricultural purposes (the algae more particularly in this case, perhaps also in the previous one), the author discusses, in this remainder of the paper, the manifold industrial uses of the algae and alginates, in many brief paragraphs.

Hydrogen Peroxide in Bleaching

E. Billot-Mornet—TIBA 10, 497 (1932).—The concluding section of the paper, already cited as to previous parts. This section is a very careful discussion of the whole subject.

As a matter of interest, it may be added that, in this same issue of TIBA (p. 541), in the correspondence column, the question is asked by a reader whether there is any advantage in replacing the sulfur bleach by the peroxide bleach, for woolen goods. One expert replies: "As a wool expert, I can state that there is absolutely no advantage in replacing sulfur bleaching by peroxide bleaching, for the three reasons of economy (250%), more superior whites, greater luster" on the side of the sulfur bleach. Another, who does not call himself an expert, states: "There is actually a very great advantage in substituting the peroxide bleach for the sulfur method." He gives as his reasons the obtaining of a better white, a better luster, the whites being stable, and the lack of disagreeable odor. It is evidently a matter of opinion, or the result of different details of working.

Shellac Gathering in India

B. K. Dee—Faerben-Chemiker—4, 325 (1933).—A continuation of a paper previously here noted. The present section contains six illustrations, and describes the four trees from which the lac is gathered—of the genera *Premna, Butea, Acacia,* and *Ficus;* an odd fact, that such unrelated growths should produce the same exudation, if such is really the case. The gatherers, sorters, etc., are paid in salt, not money.

Microchemical Test for Damaged Wool

Dr. P. Krais and O. Viertel—Monats. f. Textil-Ind 45, 153 (1933).—The usual tests, especially the mechanical ones, for determination of the quality, or condition, rather, of wool, especially the determination of whether or not it has been damaged so as to lose tensile strength, are easy to carry out, and give satisfactory results, especially in the case of yarns or twist. But, when the fiber has been damaged only slightly, and the question is rather one of possible collapse of the fabric after considerable, but not excessive use (the reviewer has had to deal lately with such a case, in which the weave possessed a very satisfactory breaking-strength when finished, and stood severe use for months, then beginning to disintegrate very suddenly), the usual tests give no satisfactory results at all, as only in very rare instances is there available a specimen of the original, certainly undamaged wool, for comparison.

The chemical tests thus far available are even less decisive than the mechanical. Chemical analysis of the wool for nitrogen and sulfur really mean nothing at all, as the composition of wool varies so greatly (e.g., the sulfur-content of average wool may be anywhere from 2 to 4%). Some chemical tests depend upon the detection in the wool of certain sometimes characteristic degradation-products of the wool substance, e.g., the biuret reaction, the reaction with stannous chloride, the bichromate number, the phosphotungstic acid test, the diazo-reaction, and the Allwoerden reaction. Each and all of these tests give at times very satisfactory results as to themselves, but deceitful as to the actual state of affairs in the wool fiber; the wool, for example, may have suffered in some way very serious damage, and the degradation-products formed, upon whose presence the above tests depend, may have been completely removed in the subsequent processes of washing, etc., in the working up of the wool. The various staining tests with dyestuffs (e.g., the Methylene Blue test) are very satisfactory, but cannot be used except upon undyed material. For a really decisive test, two conditions must be fulfilled: (1) the method must give visible results, not only in cases of heavy damage, but must indicate even the very beginning of the process of degradation, so to speak; (2) the method must be absolutely independent of the condition of the wool, in the broadest sense; whether the wool has or has not been after-treated in any way, whether dyed, fulled, finished, etc.; whether or not it is yarn or in piece. The authors have worked out a method of testing which appears to fulfill these conditions; a simple test, which has been carefully checked.

The test depends upon this fact: if one allows an ammoniacal solution of caustic potash to act upon wool damaged by acid, the fiber first swells strongly, then, after a short time, according to the degree of damage, small to large rounded projections appear (seem to swell out) upon the fiber, which rapidly pass into actual blisters, besetting the fiber along its whole length, at various intervals. To carry out the test, one proceeds as follows: 20 g. of stick caustic potash are dissolved in 50 cc. of strong ammonia water, with gentle shaking about, and good cooling under running water. The solution may well be left to stand for a while after the caustic has dissolved, to allow excess of ammonia to escape, as otherwise this causes trouble from formation of bubbles beneath the cover-glass. The solution keeps well if kept stoppered. For use, a few fibers of the wool are placed upon a microscope-slide, a cover-glass placed over them, and the microscope focussed approximately upon them. A little of the potash-ammonia solution is now allowed to flow between the cover-glass and slide, so as to wet the fibers, and the microscope at once focussed carefully upon the fibers, and their behavior watched. It is most easy to follow the course of the test with powers from 250 to 350 magnifications. As the fiber swells, its longitu-

dinal striations become more and more visible. The sharp outlines of the scaly layer begin to soften and disappear, and gradually small, rounded swellings ("Ausbeulungen") appear upon the surface of the fiber, these developing soon into veritable large blisters. The rate at which these phenomena takes place successively affords some idea of the amount of damage which the fiber has suffered, and can, of course, be measured with a stop-watch for comparative figures.

The test is specific for wool damaged with acid, but of course, the same phenomena will be observed with undamaged wool, appearing, however, much more slowly. The blisters will be very small, and at relatively great distances along the fiber. By a previous treatment of the wool being examined with alkali, the interval of appearance of the phenomena will still further be lengthened (an exact study of the subject will be found in a dissertation by O. Viertel, the junior author, "Wool-Damage and Wool-Protection," Dresden, 1933). The times of appearance of the different stages of the test vary greatly, according to the fineness of the wool.

The final condition of the wool undergoing this test is interesting. Damaged wool-fibers display a "wrecked" condition of surface—irregular, corroded, disintegrated; an undamaged fiber will be greatly swollen, but its surface will appear smooth and definite in contour. As the test depends upon the behavior of the scaly surface of the fiber, the phenomena are not so strikingly evident when this layer has been attacked, altered, or destroyed—as in the case of chlored wool. In such a case, the characteristic blisters do not appear, but the whole surface of the fiber seems to swell, this swollen surface finally widening out to spherical protrusions, which finally assume the form of bubbles. A little experience, however, makes it easy to interpret all these phenomena.

Vat Dyestuffs (iso-Dibenzanthrone Series)

German Patent No. 470,500 (8/I/'29) (*addition to G. P. No.* 409,689 *of* 7/VII/'22)—*I. G. Farben-Ind. A.-G.*—The process here protected aims at the production of iso-dibenzanthrones (parent substances and substitution products), and consists essentially in treatment of 2-bz'-diabenzanthronyl or its derivatives with alkaline or acid condensing agents. The original patent is so extended that the synthesis of the iso-debenzanthrones themselves can be combined with that of the dibenzanthronyls. If the condensing agents are able to act also as halogenatting agents, the products in some cases come out as halogen derivatives (example 4, e.g., uses the dibenzanthronyl above mentioned, heating at 250° C. with anhydrous ferric chloride and dry common salt as a solid diluting agent;) the product contains chlorine, and dyes cotton a blue-violet from a blue vat.

Four examples are given.

Azo Dyestuffs (Perimidine Series)

German Patent No. 476,809 (31/V/'29)—*I. G. Farben-Ind. A.-G.*—Two equivalent methods are covered in the present procedure: either coupling diazotized o-hydroxy-amines to 1-8-naphthylene-diamines, and converting the products to perimidines by proper treatment of the peri amino groups, or using suitable already formed perimidines as the second component, coupling the above o-hydroxy-diazo salts to them. As the products in any case will be o-hydroxy azo dyestuffs (e.g., after they are suitable for treatment with certain metallic salts, e.g., after-chroming upon the fiber, or pretreatment in substance with chromium formate, for introduction of chromium into the molecule, before using the product as a dyestuff). The dyeings may also be after-coppered, and they are very fast to washing, fulling, perspiration, carbonizing, and light, as well as dyeing very level to start with.

Four examples are given, the products dyeing wool bordeaux, red-brown, blue-violet, reddish-black, the first two of which pass to a clear greenish-blue and to a green upon after-chroming, while the third and fourth, on after-coppering, pass to a blue-black in each case.

O-Hydroxy Azo Dyestuffs (Prechromed)

German Patent No. 475,686 (30/IV/'29)—*I. G. Farben-Ind. A.-G.*—The dyestuffs to which this procedure applies are mono-azo couplings of amines containing an ether (oxy-alkyl) group ortho to the amino group, this latter being diazotized and the diazo salt coupled to suitable second components (as naphthol-sulfonic acids, for example). The products are then treated with chromium salts (chromium formate, e.g., under pressure at 125°-130° C.), under such conditions as will not only introduce chromium into the molecule, but also split off the alkyl residue of the ether group. As the precise way in which chromium enters the molecule (or in fact about the whole of such a situation, save that chromium does enter the molecule) is not yet at all understood, it is not evident whether the alkyl residue splits off before the chroming, during it as a consequence, or independently and concomitantly. The point to be noted practically is, that the diazotized amino-ethers, through the nullification of the properties of the free hydroxyl, couple to second components easily and rapidly, and upon cleavage of the ether group yield the same dyestuffs as could otherwise be obtained only by tedious and unsatisfactory coupling of the corresponding diazotized amino-phenols, which diazotize badly and couple badly. The products to be chromed are in this case cleaner dyestuffs to start with, since the complications involved by use of amino-phenols are avoided, and the unavoidable dull-colored by-products from such couplings are not formed and so the final products are clean; the yield of product is higher, the dyeings purer in tone.

Five examples are given.

Tetrakis-Azo Dyestuffs (Naphthol AS Series)

German Patent No. 430,555 (8/IV/'29) (*addition to*

G. P. No. 427,246 of 12/VI/'23)—I. G. Farben-Ind. A.-G.—The general process here dealt with is that of padding cloth with a member of the Naphthol AS series, and developing the dyeing with a tetrazotized disazo dyestuff, which contains two non-interfering amino groups. The general structure of the dyestuffs employed may be given as

$$H_2N—R—N=N \diagdown \\ \qquad\qquad\qquad R'', \text{ in which R and R' are two simi-} \\ H_2N—R'—N=N \diagup$$

lar or dissimilar benzene or naphthalene nuclei, which may contain substituting groups, except the sulfo group, while R" is an amino-phenol or amino naphthol (or a substitution product or homologue) or any similar compound of such structure that it may be coupled to in two positions. Such a dyestuff, when tetrazotized, will, of course, couple to two molecules of the Naphthol AS derivative, and, as the total molecular aggregate is very complex, the dyeings will be mostly dark in spectral tone, and very fast.

Three examples are given.

Tetraskis-Azo Dyestuffs (Naphthol AS Series)

German Patent No. 431,535 (10/VI/'29) (*addition to G. P. No.* 427,246 *of* 12/VI/'23 *and supplementary to G. P. No.* 427,246 *above*)—*I. G. Farben-Ind. A.-G.*—See the preceding patent. In the present case, the process cited covers mono-amino disazo dyestuffs, of the general formula.

$R—N=N—R''—N=N—R'—NH_2$, in which R, and R', may be any suitable simple or substituted nucleus of the benzene or naphthalene series (in any case not sulphonated), R" being as above a hydroxy-, dihydroxy-, amino-hydroxy-, or diamino-compound, of such nature that it may be coupled to in two positions independently. The products are diazotized and coupled to a member of the Naphthol AS series. The dyeings (or dyestuffs—they may be prepared in substance as well as dyed by developing) are deep in tone, toward the blacks, and are very fast; in some cases, the dyeings can be rendered still more fast by after-coppering.

Three examples are given.

Chrome Dyestuffs

German Patent No. 474,746 (13/IV/'29)—*Gasells. f. Chem. Ind. in Basel*—The process covers the coupling of an ortho diazo salt of a phenol sulfonated elsewhere in the ring (preferably para to the hydroxyl, to force coupling in the ortho position) to unsulfonated beta-naphthylamines, or the diazotization of an o-amino-phenyl acylate, sulfonated elsewhere in the ring, coupling of it to an unsulfonated beta-naphthylamine, and de-acylating. The products may be used to dye wool, followed by after-chroming, or may be subjected to the chroming process previously, as usual (treatment with chromium formate, etc.).

One example is given.

Chrome Dyestuffs

German Patent No. 473,527 (18/III/'29)—*Gesells. f. Chem. Ind. in Basel*—The azo dyestuff produced by diazotizing 2-amino-6-nitrophenol-4-sulfonic acid, and coupling it to beta-naphthol, is treated with suitable chromium salts, such as will introduce chromium into the molecule (chromium formate, for example). The product is a dark-colored solid, soluble in water with a violet-black color, in dilute caustic with the same color, and dyes wool from an acid bath in reddish-black tones of excellent fastness. One example is given.

Azo Dyestuffs for Acetate Silk

German Patent No. 472,355 (27/II/'29)—*Gesells. f. Chem. Ind. in Basel*—The product here described is a yellow pigment, prepared by coupling diazotized aniline to 1-(2'-chlor-)phenyl-3-methyl-5-pyrazolone. The product is insoluble in water, but when dispersed in water by means of a suitable agent, such as pulp-sulfite liquor, it dyes acetate silks a pure yellow, the dyeings being very fast. The tone of the yellow is somewhat greenish, of an attractive aspect.

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pH-Number and its Importance in the Textile Industry

Justin Hausner—Monats. f. Textil-Ind. 48, 154 (1933)—The second and closing section of a paper already noted in these columns. This is a very short section, of a very general nature. There is nothing which seems necessary to be quoted.

Action of Uviol Radiation upon Pyridine

Hans Freytag—Monats. f. Textil-Ind. 48, 155 (1933)—The author recently reported some work carried out by him upon the general topic quoted above, and more particularly upon the "photopyridine" dyestuffs (papers reviewed in these columns recently). The procedure described consisted in impregnating cotton cloth with a weak solution of pyridine in alcohol, allowing it to dry fairly well, and exposing it to Uviol radiation under a stencil, the parts of the fabric exposed assuming, after short irradiation, a coffee-brown color; such brown parts reacting with acid solutions of primary amines to form definite colored compounds (photopyridine dyestuffs of Order I), which, when treated with solutions of diazotized amines, developed derivative colored compounds (photopyridine dyestuffs of Order II). The fact that the brown substance, "photopyridine", was formed only under the influence of radiations between 254 and 266 millimus naturally limited the applicability of the process, as it was possible to use only stencils; photographic negatives absorb the above radiations (the glass is imper-

(Continued on page 713)

ANALYSIS OF SOAPS

(Continued from page 696)

are their major constituents, contain small quantities of chemical bodies known as Sterols, along with other substances which do not directly combine with the alkali used for saponifying and are not entirely removed in the manufacturing process. The percentages of these substances present vary with the type of fat stock used and in some cases will run up to 1.25%.

L—Total

In some cases two totals are given, one on a dry basis in which all moisture is excluded, the other, either the moisture content at which the sample was received or an arbitrary moisture content approximating the moisture content of the soap at the time of packing.

M—Total Alkali (Na_2O)

This figure usually given in terms of Na_2O (Sodium Oxide) is the sum of all the alkali present in the soap. Any Carbonate Alkali present, the combined alkali, free Caustic Alkali, Alkali present as Tri-Sodium Phosphate or Sodium Silicate, are all included in this figure.

N—Combined Alkali (Na_2O)

Combined alkali is just what its name implies. It is the quantity of alkali (usually given in terms of Sodium Oxide) necessary to saponify the fatty acids present in the soap.

O—Soap Acid Anhydrides—Combined Fatty Anhydride

This is the fatty materials actually combined with the above combined alkali to form the soap. This figure is usually given so as not to include any free fat which may be present in the soap.

Theoretically, the sum of the combined alkali and combined fatty acid do not represent the true total dry soap, which may be present. The explanations and calculations necessary are rather involved. Suffice it to say that a conversion factor is figured, multiplying the combined fatty acids by this factor, gives as a result the fatty anhydrides. These added to the combined alkali (as Sodium Oxide) yield the real total dry soap. Fatty *anhydrides* represent approximately 97% of the % of fatty *acids* present.

P—Insol. in Alc.—(Insoluble in Alcohol)

The determination of material insoluble in alcohol is a check on the per cent of material other than soap and moisture present. Sodium carbonate, tri-sodium phosphate, silicates, volcanic ash, etc., are insoluble in alcohol. Pure soap is soluble in alcohol. Materials found in laundry bar soap or built soaps are included under this heading.

Q—Insol. in Aq.—(Insoluble in Water)

Materials such as pumice—volcanic ash and talc will be included in this figure, materials usually found in scouring cleansers and pumice soaps.

R—Total SiO_2—(Silicon Dioxide)

In the determination of sodium silicate the soap is so treated as to separate the silicate from it. Continued treatment results in the residue being change to silicon dioxide which is accurately weighed. The per cent of sodium silicate present is calculated from this figure.

S—Total CO_2—Total Carbon Dioxide

Sodium carbonate present in varying amounts when treated with acid materials gives off carbon dioxide. By determining the per cent of carbon dioxide present it is possible to calculate the per cent of carbonated material such as sodium carbonate present.

T—Titre of Fatty Acids

The titre test of the fatty acids of an oil or fat is closely related to the melting point of that fat. With few exceptions, the properties of a soap are greatly influenced by the titre test of the fat stock used. In explanation of this, it is commonly agreed, for instance, that a tallow soap of 42 titre will stand up under a higher temperature in a wash wheel than a low grade tallow or grease soap, titre 38 to 39. Some of these properties are not, however, borne out by soap of mixed fatty acids, particularly those containing Palm Oils in various percentages. For a more complete explanation see below (Titre Test).

U—Saponification Val. (% KOH)

The saponification value of a fatty acid is an index of the amount of alkali which will combine with it to form soap. This figure is used in the laboratory as a means of identifying the fat stock used.

V—Iodine Val. (Wys), (% Iod.)

Iodine under certain conditions combines with fats and oils or fatty acid mixtures in definite quantities depending on the type of fat or oil. The determination of the iodine value of a fat or oil or fatty acid mixture is therefore a means of identifying the fatty material under examination.

The Wys. is an abbreviation of Wijs—the name of the individual who developed the particular test.

W—% Rosin in mixed Soap Acids

Rosin Fatty Acids, or Rosin is used to replace varying quantities of fats and oils in laundry bar soaps. Rosin Soaps are useful in soaps of this type for scrubbing, etc., as they increase solubility and lathering properties. Some special textile soaps are made of rosin fatty acids without the addition of other fats.

X—Wt. as rec'd—color—odor

These are physical tests and observations sometimes indicative of the quality of the product.

Bar and package items are weighed as received by the laboratory.

Y—Fats used

The titre test, saponification value and iodine value of fatty acids are used as a means of determining the approximate percentage composition of fat stocks and primarily concern the laboratory.

TITRE TEST

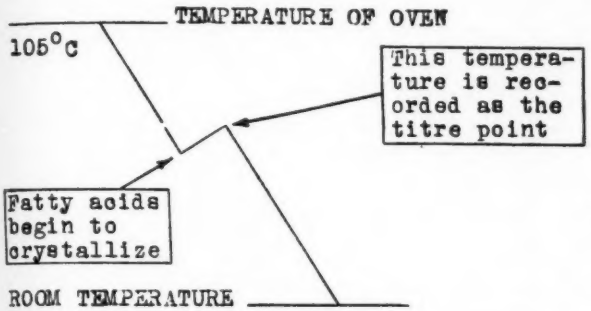
The titre test is a specially developed test for use in identifying and valuating fats and oils. Many times we hear individuals speak of the titre test of a soap. Such

a thing does not exist. The *titre test refers specifically to* the *fatty acids* which are *combined with* the *alkali to produce* a particular *soap*.

This *misunderstanding* may be *due to* the *fact* that *the titre of* the *fatty acids used to make a soap, influences* to a degree the *properties and* the *specific applications of* a *soap*.

To run the test the fatty acids in a soap are set free by the addition of acid to the soap dissolved in water. The fatty acids are washed with water and dried in an oven preparatory to running the test.

Using a special thermometer in standard apparatus the titre of the fatty acids is determined.



The accompanying diagram illustrates the temperature changes and the figure taken as the titre point.

TECHNICAL NOTES

(Continued from page 711)

meable to such wave-lengths), and so gave no images. For adoption into actual textile practice, such a limitation would prove insuperable.

The author has continued his investigations, and now finds that the coffee-colored photopyridine itself, if paper or a cotton weave impregnated with it (i.e., if the material is impregnated with pyridine-alcohol, dried, and irradiated in toto, so that the whole piece of goods is impregnated with the brown photopyridine) is exposed to diffused daylight, the color is bleached out; very rapidly if the material is exposed to direct sunlight. If the material is covered locally with glass plates of different colors, it will be found that the brown photopyridine is not bleached beneath red glass, or even under nickel-oxide glass (the filter used in studies of photo-luminescence); this being the case even when, using the latter screen, the material is exposed to irradiation of about 367 millimus. The areas covered with ordinary glass or photographic films are bleached out almost entirely. Evidently, then, photopyridine is destroyed by visible radiation, with the exception of the red.

Since the photopyridine is destroyed only when visible light attacks it, it is impossible to produce a positive print upon the material by exposing it beneath a photographic negative; it would be necessary to prepare diapositives for the purpose of printing. This, however, is merely a matter of routine. The positives obtained by printing these diapositives upon the sensitized fabric reproduce all the gradations of the diapositive, provided that the weave is sufficiently fine, and the printing is carried on so far that the bleached portions become white, or at least a very faint yellow. Such a print may be developed in an acid bath of a primary amine, providing a print in a color of Order I, and this may then be aftertreated in a bath of a diazotized amine to convert the image to a color of Order II.

OPEN FORUM

See previous issues for details of this department

New Question

22—I should be pleased to have some of the readers of the Dyestuff Reporter furnish a list of dyes satisfactory for use in transparent lacquers which are reasonably fast to light and as nearly permanent as possible.

I have understood that water glass is sometimes used for fixing dyestuffs upon wood surfaces.

If anyone has had experience along the lines mentioned above I should be pleased to hear whether such a process is satisfactory or not. Also, whether it gives a clear transparent coating of sufficient depth to correspond with a lacquer.—**K. J. L.**

Unanswered Questions

17—We are in need of mathematical text books on problems pertaining directly to textile printing but so far have been unable to find anything on the subject. If you know of texts or problems in math. especially adapted to this field, I would more than appreciate suggestions.—**O. E. M.**

20.—We have experienced partial color destroying action in basic color printing. The goods are folded face-to, and stored. The color destroying action is not uniform, showing bars, streaks, and blotches. When the material is baled this does not happen. Unfinished material does not show this result. No change in formulas over a period of years.—**G. O. Linberg.**

21—We are experiencing some difficulty in detecting and determining any amount of supposedly present compounds of Avirols, Gardinol and Neomerpin AS, in scouring, finishing, and delustering agents.

We have found in some of these new products recommended for the above purposes to have present in them; chlorides, soda ash, and starches.

Please describe a method by which one can detect and if possible determine quantitatively their pres-

ence, in such as finishing, scouring and delustering agents.

I believe that this question may also be of some interest to many of our chemist readers.—**B. U.**

● GENERAL RELEASES

The General Dyestuff Corp. announces release of the following new products:

Brilliant Indo Carbon CLB—a new sulfur dyestuff which is said to have all the fastness properties of the older Indocarbon CL Conc. or CLG brands but is considerably bluer in shade than the older types. It can be used in machines for cotton and rayon in various stages of manufacture. It is said to withstand acid cross-dyeing which, it is claimed, will make the dyestuff particularly suitable for the dyeing of warps for unions. The manufacturers recommend it for sewing cotton as well as mercerizing yarns. It is said to produce a beautiful bloomy black of a blue cast on unweighted silk.

Diazo Indigo Blue 4GLA Extra—a new product which, when dyed in the usual manner and diazotized and developed with beta naphtol, is said to produce bright greenish blue shades of very good fastness to light and good fastness to washing. The fastness to alkali, ironing and rubbing is said to be excellent. It is dischargeable.

Dullit W—a new compound which is said to enable the delustering of rayons by the one bath method. The delustering effects will stand a mild soap washing and will not dust, as the delustering is said to be formed during the working process inside the fiber. The product is also claimed to be very suitable for print effects.

Benzo Fast Scarlet 8BSA—a direct dyestuff, recommended by the manufacturers for its good fastness to acid and alkali and its bright shade, and the fact that it leaves acetate silk white.

Copies of circulars describing the above mentioned products in detail are available upon request.

● PURCHASE PLANT

The Geigy Company, Inc., has purchased the industrial plant formerly occupied by the Duryea Manufacturing Co. in Bayonne, N. J. The building is of concrete construction and contains approximately 55,000 square feet of working space and a railroad siding serves it. The purchase of this plant is an expansion which has been contemplated for some time. It is believed that the building will be occupied about the first of March after alterations have been completed.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

OPPORTUNITY—CHEMIST. One experienced in textile oils and finishes. There will be an opening in our company about the first of the year. List experience, by whom employed and salary expected. Reply to Box No. 840, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Rayon processing man, graduate chemist, capable of taking charge of production and improvements desires connection with progressive concern. Write Box No. 841, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Chemist thoroughly familiar with dyestuffs desires position where his knowledge of Chemistry and practical dyeing and finishing methods would prove beneficial making possible economical purchases of dyestuffs and chemicals as well as cooperation in locating and eliminating troubles in the practical dyeing and finishing of woolens, worsteds and unions. Write Box No. 842, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Two years' laboratory experience, ten years foreman hosiery dyer and also dye vat dye and rayon. Night school training in laboratory work. Can furnish reference. 30 years of age and married. Write Box No. 843, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Textile Chemist. Man possessing good laboratory technique and thorough factory knowledge of testing thickeners employed in printing gums for cotton and rayons. Knowledge of dyes and sizing and finishing compounds also desirable. Good future for man who can assist in developing new printing and finishing gums. Must have pleasing personality for technical sales work. Write age, married or single, education, former employers with dates and salary received and send small picture to Box No. 844, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Used Buhlman and Giles machine for dyeing rayon skeins, also two truck skein dryer. Must be in good condition. Box No. 845, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.